A TREATISE ON MAGNETISM,

WITH A

DESCRIPTION AND EXPLANATION OF A Meridional and Azimuth Compass,

FOR ASCERTAINING THE

QUANTITY OF VARIATION,

WITHOUT ANY CALCULATION WHATEVER,

AT ANY TIME OF THE DAY.

ALSO

IMPROVEMENTS UPON COMPASSES IN GENERAL.

WITH

TABLES OF VARIATION,

FOR

ALL LATITUDES AND LONGITUDES.

BY RALPH WALKER,
OF JAMAICA.

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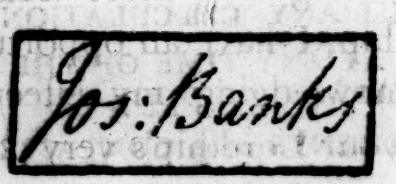
1794.



TO

EARL CHATHAM, K. G.

FIRST LORD OF THE ADMIRALTY, AND PRESIDENT OF THE HONOURABLE BOARD OF LONGITUDE, &c. &c. &c.

MY LORD,

IN addreſſing this ſhort treatiſe to your Lordſhip, I have an opportunity of publicly acknowledging my eſteem and gratitude for your Lordſhip's very polite and condeſcending attention to me ever ſince I have had the honour of being recommended to your Lordſhip's notice by our very worthy Governor of Jamaica, General Adam Williamſon.

I think myſelf peculiarly happy in having had the good fortune to bring forward this improvement in navigation under the auſpices and protection of your Lordſhip, and the worthy Admirals Affleck and Gardner, Lords Commiſſioners of His Majeſty's Board of Admiralty, who, at a time when it might have been thought that more weighty conſiderations would have occupied the

whole of their attention, did not neglect to encourage, and bring into uſe, what was thought would be of advantage to His Majeſty's Navy.

I cannot but acknowledge the many obligations I am under to Admiral Macbride, for his particular kindneſs and attention to me while on board of His Majeſty's ſhip the Invincible, for the purpoſe of trying the utility of my Compaſſes, agreeable to the directions from the Board of Admiralty.

I beg your Lordſhip will accept of this Dedication, as a teſtimony of my eſteem and reſpect to a Name that is ſo deſervedly venerated in this country, and particularly by,

My Lord,

Your Lordſhip's

Moſt obedient and

Very humble Servant,

RALPH WALKER.

London,
Sept. 4, 1794.

PREFACE.

WHEN I left Jamaica for the purpoſe of laying my meridional and azimuth compaſs, and improvements upon compaſſes in genetal, before the Board of Longitude, I had no intention of publiſhing this treatiſe; but finding that the errors in the conſtruction of the needles of the preſent compaſſes, and my improvements, could not be well explained, without entering at ſome length into what I think the principles of magnetiſm; the firſt thing that ſtruck my attention was, that although the compaſſes uſed at ſea, were all adjuſted by the inſtrument-makers, before the ſhips proceeded upon their voyages, yet in a very ſhort time they all differ from each other.

In endeavouring to explain the cauſe of this change of the magnetic polarity in the needles, and my improvements, and the principles upon which I have calculated my tables of variation, I have been led in a ſort of retrograde progreſſion, from ſimple facts, into the following theory.

Caſes I. and II. are moſtly compoſed of probable conjecture; and although I have ventured to give my opinion, and the reaſons upon which it is founded, yet it is with the greateſt diffidence, as it is upon a matter that has baffled the ſtudy and reſearches of the greateſt philoſophers. How far I may have ſucceeded in attempting to explain

what

what magnetiſm is, time, and the impreſſion and conviction that this theory may make upon the mind of the reader, will beſt determine.

Caſe III. is founded upon what I conceive to be facts. The firſt is, That the earth, or any other moving body, cannot give a motion greater, nor even equal to what it is itſelf poſſeſſed of; therefore the magnetic poles not being permanently ſtationary, muſt recede from the eaſt towards the weſt. But to put the matter beyond all diſpute, the lines of no variation are traced from the earlieſt obſervations, to the preſent time; and it appears, that the line of no variation, with eaſt variation on the weſt ſide of it, and weſt variation on the eaſt ſide, when firſt taken notice of in the year 1638, was conſiderably to the eaſtward of London and Paris,* and was not at London until the year 1657, and at this time is to be found croſſing the Atlantic ocean in an oblique direction from the ſouth eaſt towards the north weſt. The other line of no variation being but little taken notice of, in the earlieſt obſervations, cannot be ſo eaſily and accurately traced ſo far back; but there can be no doubt but that it has always kept nearly the ſame proportionate diſtance from the other, that it is at preſent. One thing is certain, that it is not the line of no variation that was at London in the year 1657, becauſe it has weſt variation upon the weſt ſide of it, and eaſt variation on the eaſt ſide; from which I have inferred, that the magnetic poles change their places from eaſt to-

* See *Caſe* III. and the Appendix.

towards the weſt, although not with any regularity.

Caſe IV. treats of the effect of the magnetic polarity of the needle of the compaſs with reſpect to the variation, or it's declination from the true meridian, and explains the cauſe of the variation changing, or increaſing and decreaſing more in one number of years, than in another of the ſame quantity of time; and alſo why the variation changes, or increaſes and decreaſes more in one number of degrees of longitude, than in another of the ſame quantity of degrees; and the cauſe of the variation changing from eaſt to weſt, and from weſt to eaſt, in the different latitudes and longitudes; with the principles upon which the tables of variation are calculated.

Caſe V. relates to the dip of the needle, which may be made of great uſe in navigation with reſpect to finding the longitude, becauſe in the longitudes where the variation changes the leaſt, the dip of the needle changes the moſt; ſo that in all latitudes and longitudes, where the variation does not increaſe or decreaſe upwards of twenty-five minutes in a degree of longitude, the dip does. So that with my meridional or azimuth compaſs, (the conſtruction of which is deſcribed in this *Caſe*) and a dipping needle ſuch as I have now made, the longitude may be found without any error of conſequence; and as there is no calculation neceſſary, in finding the longitude by this method no miſtakes can happen, ſuch as frequently occur in depending upon time-keepers, which are liable

to

to ſtop altogether, or to go irregular in proportion to the change of the atmoſphere, and from the inaccuracy of the obſervers in taking their altitudes and diſtances, and in taking out the numbers from tables, which they in general know little more of than the name.

The tables of the variation of the compaſs for the northern Atlantic ocean, are already calculated and publiſhed with this treatiſe; alſo a very general collection of obſervations of the variation and dip of the needle, which have been made by all the moſt eminent circumnavigators of all countries, which in general demonſtrate the truth of this theory.

My compaſſes have already been proved on board of His Majeſty's ſhips, by order of my Lords Commiſſioners of His Majeſty's Board of Admiralty, and reports of their utility have been returned to the Hon. Philip Stephens, Eſq. copies of which are inſerted in the Appendix. In the report of Mr. M. Downie, maſter of His Majeſty's ſhip Glory, are ſome very pertinent and uſeful remarks, which were made by the particular direction of Admiral Murray.

The firſt part of the Appendix contains a few curſory remarks upon the whole, with ſome hints to ſhip-builders and navigators reſpecting the keeping of the compaſs on board of ſhips at a proper

per distance from iron. The last part contains a few hints relative to the surveying of lands, and fixing the boundaries of properties, particularly in our colonies.

As this treatise is not intended for the learned, but for those of my own profession, it is therefore divested of the tinsel and technical terms of the professional philosopher, that it may be the more easily understood by the most uncultivated capacity; and in order to render the whole more generally useful in navigation, I have spared neither expence, time, nor attention.

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ERRATA.

Page 51, line 7, *for* plate 5, *read* plate 6.

Page 55, in the New Tables of the Variation, for the Variation in the Lat. of 50°, and Long. 9°, *for* 23° 40, *read* 24° 42.

Page 56, Lat. 50°, Long. 10°, *for* 23° 56, *read* 24° 46.
Lat. 50°, Long. 11°, *for* 24° 25, *read* 24° 56.
Lat. 50°, Long. 12°, *for* 24° 50, *read* 25° 00.

A

TREATISE

ON

MAGNETISM

CASE I.

Conjectures what Magnetiſm is.

AS no theory has as yet been eſtabliſhed, or has proved to a conviction, what magnetiſm is, it will be no preſumption to hazard a conjecture, that it is a fluid element which pervades this globe, or perhaps the whole univerſe.

That our atmoſphere is in part compoſed of magnetiſm, or magnetic matter, as well as of air, water, and fire, there can be but little doubt. Theſe fluids have all a very great affinity to each other; particularly the electric and magnetic.

The electric fluid being of two qualities, viz. poſitive, and negative; ſo is magnetiſm of two qualities, poſitive and negative, or north and ſouth polarities.

Qualities of the ſame name in electricity repel each other; and of different, attract. In magnetiſm it is the ſame; poles of the ſame name repel each other, but of different names, they attract each other.

Poſitive and negative electricity cannot be produced ſeparately. In magnetiſm, one polarity cannot be produced without the other.

That there is a magnetic fluid in our atmoſphere, which has a very great affinity with the electric fluid, can hardly be doubted from the following circumſtance.

In the Iſland of Jamaica, in the month of September, 1792, one end of my houſe was ſhattered to pieces by lightning, which killed one young woman, and very much hurt another in a part of the houſe that had received but very little damage. A girl who at that time had ſtood cloſe to the one that was killed, (but was not in the leaſt hurt,) took out her needles ſoon after, to aſſiſt in making a dreſs for the one that was dead; the needles ſtuck all together in her hand ſo ſtrongly, that ſhe took the points of her ſciſſars to ſeparate them; and ſo powerfully were they and the ſciſſars magnetic, that part of the needles ſtuck to them in different directions, and they lifted up the remainder like a thread,

thread, each needle hanging by the end of another. This phenomenon happening within my own knowledge, leads me to infer, that although the magnetic fluid may be inactive in the atmoſphere at ſome diſtance from the earth, yet it may be ſo decompoſed, and put in motion by the concuſſion of the electric matter in the clouds, that an accumulated body of each of theſe fluids (their affinity being ſo very near to each other) do in general deſcend together, to their common recipient, the earth.

This will alſo account why iron is the beſt conductor for ſaving buildings, &c. from the effects of lightning; for if the electric matter, or ball of fire, which is in motion, be within the ſphere of the magnetic attraction, it will be drawn by the vortex of the magnetic fluid to the iron, and diſcharged into the earth.

If the magnetic power was not a fluid, or an atmoſpheric element, but an inherent principle in the earth; every particle of it, that is poſſeſſed of iron, would be poſſeſſed of that permanent quality, and their poles would be unalterable.

But this is not the caſe. The poles of the beſt magnets are very eaſily changed; and all iron, which has not been charged with the magnetic power from a magnet, (either natural or artificial) changes it's poles as often as it's poſition is reverſed; for if a bar of iron be held horizontal with it's ends pointing north and ſouth, upon the

magnetic equator, or at equal diſtance from the magnetic poles, it will be poſſeſſed of the ſame quality that the magnetic needle is poſſeſſed of; but if it's poſition is reverſed, it's polarity will be changed; and whatever end of it is placed to the north, will be poſſeſſed of the ſame ſort of polarity, with the north end of the magnetic needle.

This phenomenon holds good in all parts of the world; for at any part of the globe, if a bar of iron be held in the poſition of the dipping needle, it will be poſſeſſed of ſimilar qualities; and if the bar be reverſed, the ends of it will immediately change their polarities.

The magnetic poles of our globe are alſo perpetually changing their places, ſo that there can be no reaſon whatever to found a ſuppoſition, that magnetiſm is an innate quality in the earth, but the reverſe, namely, that it is an external principle acting upon it.

As, where we have no evident facts to judge from, we muſt infer from analogy; therefore, if magnetiſm was an internal quality in the earth, the magnetic needle, in all parts of the world, would have the ſame quantity of dip, and point towards the center of the earth, or ſtand in a perpendicular direction, the lower end of it being poſſeſſed of attractive magnetiſm, and the upper of repulſive; and if brought to an horizontal poſition, would have no polarity.

But if we ſuppoſe that magnetiſm is an atmoſpheric

ſpheric principle, and that one of the ſorts of it is attracted by the northern hemiſphere, and the other by the ſouthern hemiſphere; or, which is a fact, that that ſort of magnetiſm, which is the attractive in one hemiſphere, is the repulſive in the other, as is repreſented in *fig.* 1, *pl.* 1, which agrees exactly with the experiment of the magnetic ball, and filings of iron or ſteel, we have then this experiment to ſupport this ſuppoſition.

Suppoſe *pl.* 1, *fig.* 2, to be a globe with a magnetic bar repreſenting it's poles. If a magnetic needle be applied to any part of the ſurface of the globe, it will by no means point out the dip of the needle, ſuch as is found by actual obſervations at different parts of the world; but ſuch as is marked upon the outſide circle, 22, 41, 55, &c. &c. which is in ſome degree a proof that magnetiſm is not an innate quality in the earth.

But if we take a magnetic bar, and move a magnetic needle on a parallel with it, until we come to the points where the needle will ſtand perpendicular to the bar; then mark theſe points, as in *pl.* 1, *fig.* 3, at N. and S. and draw the circle, whoſe diameter is equal to the diſtance contained between theſe points; divide it into degrees, and deſcribe parallels of latitude to theſe degrees. If the magnetic needle be moved from the equator, upon a line parallel to the magnetic bar, at each of theſe parallels of latitude, it will point out a dip of the needle, which will be found to agree tolerably

tolerably well with what obſervations have been made.

As the magnetic bar in this experiment extends beyond the circle, a conſiderable diſtance, it appears by it, that the magnetic attraction of the earth is at it's ſurface, and not internal; and from which I am led to conjecture, that the magnetic vortices are not loſt at the ſurface of the earth, but are extended as far as our hemiſphere, or as far as comes within the ſphere of the earth's attraction.

If magnetiſm was not an atmoſpheric quality, all magnetic needles would point to each of the magnetic poles in proportion to their diſtances, inverſely, from the needle; but this is not the caſe, for it is a fact well known, that on board of all armed veſſels, where there are great quantities of iron, the current of polarity is deranged in a very great degree.

The preſent Admiral Murray, and Captain Penroſe, when cruiſing off the Neas of Norway, found that when the ſhip's head was in ſhore, it made a difference of nearly a point in the compaſs, from what it was when the ſhip's head was off ſhore; and as many navigators as have been accurate in their obſervations, have taken notice of the ſame phenomenon in different parts of the world. By this remark it is not meant to inſinuate, that ſuch change in the direction of the needle was owing to any effect that the ſhore had upon it, but only, that by being in ſight of the ſhore, an opportunity

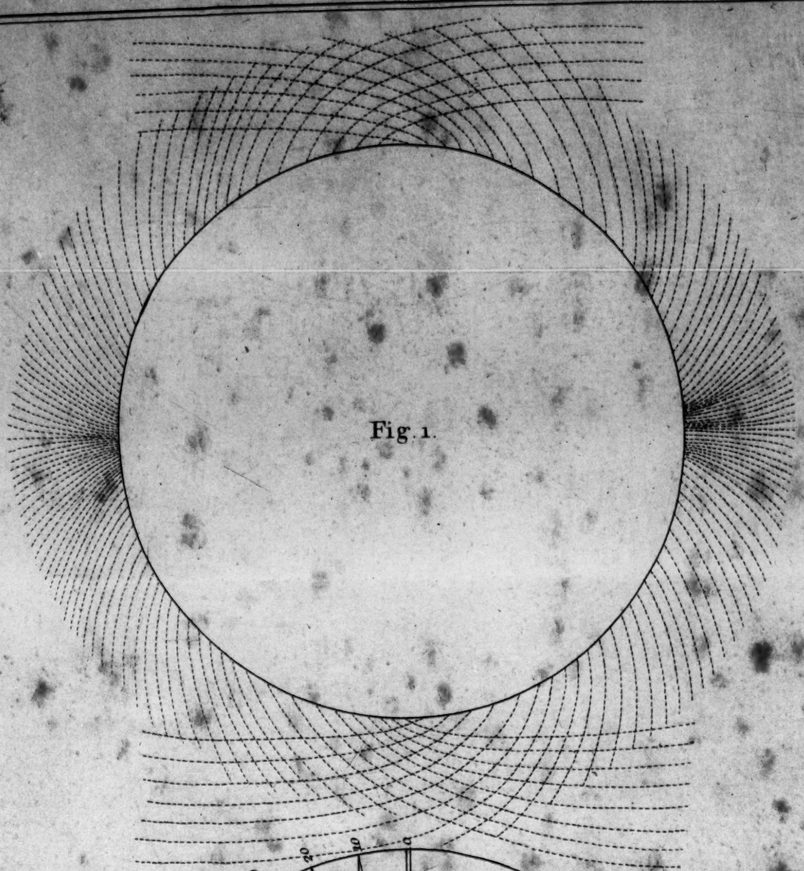


Fig. 1.

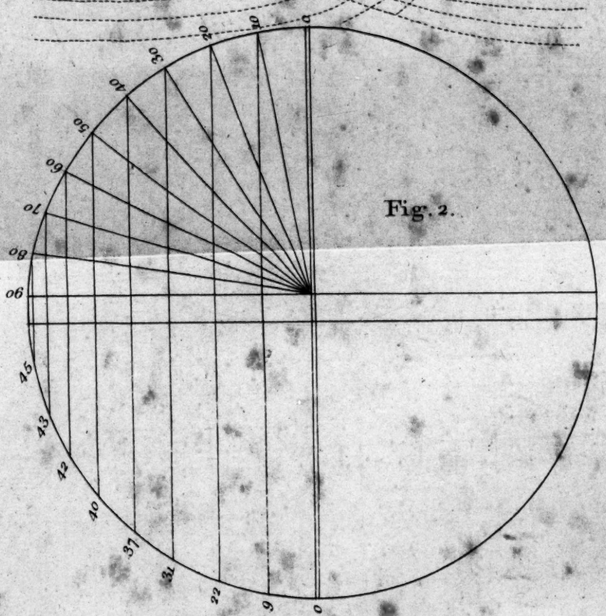


Fig. 2.

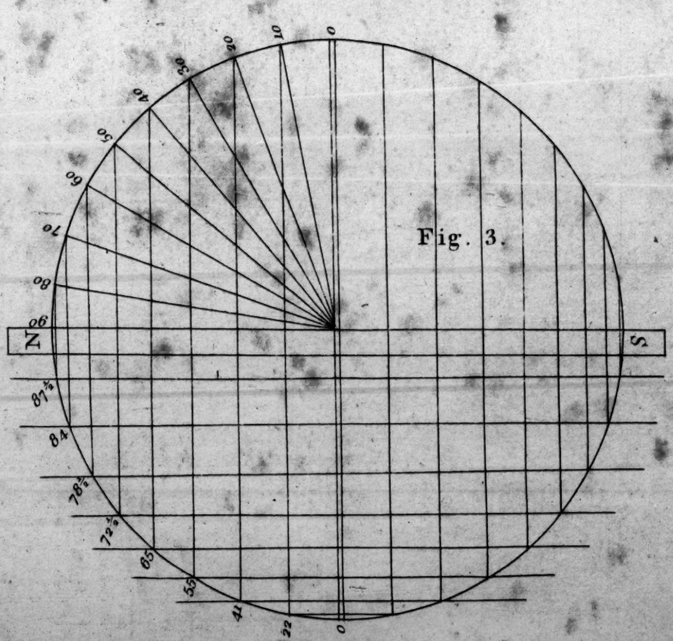


Fig. 3.

London. Printed for and Published by Ralph Walker of Jamaica, as the Act directs 4th. Sept.r 1794.

Jo.s Ledge sculp.

opportunity was had of aſcertaining the fact. For although all ſhores and head-lands may have a very great effect in deranging the univerſal current of the magnetic polarity, yet it is not to be ſuppoſed that the change of the poſition of a ſhip can change the polarity of any place, but only ſo much of it, as comes within the ſphere of action of the iron which may be on board of her.

After all theſe reaſons, and what I have already ſaid, namely, reſpecting the affinity between magnetiſm and electricity, I will ſtill venture a little farther, and ſuppoſe that magnetiſm, from the ſmallneſs of it's particles, is enabled to pervade every other matter whatſoever; and as every thing that has or may have had any affinity with this earth, muſt in ſome degree be impregnated with a certain quantity of ferruginous matter, however ſmall the quantity may be, and imperceptible to us; therefore every globule of air, that is in our atmoſphere, may be ſuppoſed to have been in contact with the earth, and of courſe become in ſome degree poſſeſſed of every quality of it; which is evident from it's carrying vapours and odorous qualities, &c. into the uppermoſt parts of the atmoſphere with it, where it will be acted upon, as well as at the ſurface of the earth, by the magnetic power, and every particle of it will become poſſeſſed of a north and ſouth pole, and be ranged in order, correſponding to the magnetic meridians; ſo that all meteors which are occaſioned either by the

the electric matter in the atmoſphere, or by the reflection of the ſun's rays, will have a relative connection with theſe meridians; and as all meteors are the cauſe of a fluctuation in that part of the atmoſphere where they are, which may be occaſioned either by the expanſion and condenſation of the particles of the air, or a difference in the humidity of the different parts of the atmoſphere which paſs through them; therefore the magnetic polarity will in ſome degree be decompoſed by their concuſſionary ſhocks, and have a very viſible effect upon the magnetic needle.

CASE

CASE II.

The Cauſe of the Magnetic Poles differing from the Poles of the Earth.

IF the ſun or heat has the ſame effect upon the magnetic effluvia, that it has upon all other fluids, the quantity contained in the torrid zone will be conſiderably leſs than in the frigid zones, on account of it's rarifaction; ſo that the nearer to the poles of the earth, it's denſity will be the greater, and will there form a vortex of attraction, or what is called the magnetic poles. By theſe poles, it is not here meant, that the magnetic effluvia can be coincentered into a ſmall point, but that the denſity of it, or what may be called the magnetic polar attraction, increaſes in power, in a ſort of geometrical progreſſion, the nearer to the center of theſe magnetic vortices. This ſuppoſition will be accounted for, when treating of the magnetic effect upon the needle of the compaſs.

But as the earth is now underſtood to be an oblate ſperoid, and ſuppoſed to be flat about the poles, therefore a fluid current can neither be received or diſcharged at them, but at a greater diameter of the globe, which muſt be at ſome diſtance from the true north and ſouth poles, which will be occaſioned by the tenacity or adheſion, that

all fluids have to ſolid bodies; this would alſo be the cauſe of the magnetic poles being in meridians exactly oppoſite to each other, if it was not for their mutual attraction, which will draw them from oppoſite meridians to others, where adheſion and their attraction will be counterballanced, and their parallels of latitude eſtabliſhed at that time.

CASE

CASE III.

The Cauſe of the Magnetic Poles changing their Places; and whether they change their Places from Eaſt to Weſt, or from Weſt to Eaſt.

AS the earth from it's diurnal motion, or any other moving body, cannot communicate, or give a force greater, nor even equal to what it is itſelf poſſeſſed of; and as the motion of the earth is from weſt to eaſt, the ſun alſo having an effect upon all fluids, it is but reaſonable to ſuppoſe that the magnetic poles will not be carried round, or make a revolution in the ſame time that the earth does, but will change their meridians of longitude from eaſt to weſt, however ſlow their motion may be.

Having proceeded ſo far upon what may be called probable conjecture, it will now be neceſſary to inſert ſuch obſervations as have formerly been made, and compare them with what has already been ſaid reſpecting the motion or change of the magnetic poles from eaſt to weſt.

TABLE I.

Variations of the Magnetic Needle observed at London.

		° ′	
By Burrows in - -	1576	11 15	E. Variatn.
	1612	6 10	
By Gunter - -	1622	6 00	
By Gilbert - -	1634	4 05	
By Bond - -	1657	0 00	
	1666	1 35	Weſt.
By Halley - -	1683	4 30	
	1700	8 00	
By Graham - -	1722	14 22	

TABLE II.

Variation obſerved at Paris in the following Years.

In	° ′	In	° ′	In	° ′
1550	8 00E.	1698	7 40W	1715	11 10W
1580	11 30	1699	8 10	1716	12 20
1610	8 00	1700	8 12	1717	12 20
1640	3 00	1701	8 25	1718	12 30
1664	0 40	1702	8 48	1719	12 30
1666	0 00	1703	9 06	1720	13 00
1670	1 30W	1704	9 20	1721	13 00
1680	2 40	1705	9 35	1722	13 00
1681	2 30	1706	9 48	1723	13 00
1683	3 05	1707	10 10	1724	13 00
1684	4 10	1708	10 15	1725	13 15
1685	4 10	1709	10 15	1726	13 45
1686	4 30	1710	10 50	1727	14 00
1692	5 50	1711	10 50	1728	14 00
1693	6 20	1712	11 15		
1695	6 48	1713	11 12		
1696	7 08	1714	11 30		

TABLE

TABLE III.

Variation of the Compaſs, inſerted in the Tranſactions of Leipſick, in the Year 1684.

Places.	Times.	Lat.	Long.	Variat.
		° ′	° ′	° ′
London	1580	51 32N	0 00	11 15E.
	1622			6 00E.
	1634			4 05E.
	1672			2 30W
Paris	1640	48 51N	2 55E.	3 00E.
	1666			0 00
	1681			2 30W
Dantzick	1679	54 23N.	19 00E.	7 00W
Rome	1681	41 50N.	13 00E.	5 00W
Byonne	1680	40 33N.	1 20W	1 20W
At Sea	1682	43 50N.	31 30W	5 30
C.St.Aguſtine	1670	8 00S.	35 30	5 30E.
At Sea	1675	34 00S.	20 00	10 30E.
St. Helena	1677	16 00S.	6 30	0 40E.
At Sea	1676	0 00	64 30	15 30W
V.Dieman'sld.	1642	42 25	142 00E.	0 00
		34 00	1 20	0 00

TABLE IV.

Variation of the Needle obſerved in 1708.

Places.	Latitude.	Longitude.	Variation.
	° ′	° ′	° ′
Sardinia	40 00N.	9 03E.	10 00W
Malta	35 53	14 20	10 25
At Sea	5 49	21 33W	0 07W
	5 24	19 25W	0 00
	Equator	22 25W	0 37E.
	2 26S.	23 25W	1 05E.
	8 04	24 25W	1 07E.
	20 21	26 50W	8 11E.

TABLE

TABLE V.

Declination of the Magnet observed in 1703, *described in the History of the Royal Academy of Paris* 1705.

Places.	Latitude.	Longitude.	Variation.
	° ′	° ′	° ′
At Sea	5 40N.	18 25W	1 30W
	5 20S.	20 25	1 00.E
	11 15	24 40	1 30
	21 00	26 25	6 30
	34 40	8 40	3 15
	36 20	7 45E.	3 00W
	36 20	24 35	13 0
	32 50	52 35	25 30
	22 40	80 35	15 00

TABLE VI.

Magnetic Declination observed in the Years 1704 *and* 1705, *inserted in L'Hist. de l' Acad. Roy. Anno* 1708.

Places.	Latitude.	Longitude.	Variation.
	° ′	° ′	° ′
	22 00N.	19 25W	0 00
	16 00S.	22 40	2 30E.
	18 00	22 25	3 08
	23 00	22 25	3 10
	28 00	19 25	6 00
Cape Bona Esperenza	34 22	18 45E.	9to10W
In 1680			7 30
Mosembeque channel.	15 08	40 53	22 23
	0 00	53 35	16 00
	15 00N.	70 35	10 30
Cape Comerin	7 55	77 20	7 30
Ceylon	8 32	81 40	5 30

Cape

Places.	Latitude.	Longitude.	Variation.
	° ′	° ′	° ′
Cape Coromand.			5 00
Muritii	20 10	57 22	21 00
Iſland Bourbon	20 50S.	53 35	21 30
At Sea	25 00	57 35	23 30
	27 15	56 20	24 30
	33 10	49 20	14 30
	0 00	19 20W	0 00
Iſld. Aſcenſion	7 57	13 54	0to1E.
At Corva	39 41N.	31 00W	4 30W
Cape Anguillas 1672	34 44S.	20 32E.	2 00
Diego Rioz in 1670	20 00	61 00	20 30W
From obſervations in the tranſactions of the Society of Jeſu. before 1600			20 00E.

TABLE VII.

Variation of the Compaſs obſerved in the Mediterranean in the Year 1638.

Places.	Latitude.	Longitude.	Variation.
	° ′	° ′	° ′
Corſica	42 N.	9 50E.	7 30E.
Ivica	38 50	1 09	5 00
Vulcano	38 27	15 13	2 19
Meſſina, in Sicily	38 07	16 20	0 10
In Archipelago			0 00
Conſtantinople	40	29 00	0 00

TABLE

TABLE VIII.

Variations of the Compaſs, obſerved by Captain Cook, in the Years 1773, 1774, 1775, 1776, 1778, *and* 1779, *&c.*

Latitude.	Longitude.	Variation.
New Zealand.		° ′
° ′	° ′	14to15E.
43 19S.	157 17E.	11 20
37 50	149 31	3 07
36 18	150	10 40
35 27	150 37	9 50
35 19	150 18	7 55
34 29	151 15	8 48
34 (or Botany Bay)	151 23	8 00
33 22	151 40	8 25
32 02	152 30	9 10
25 34	153 15	8 30
21 27	149 03	6 45
19 12	Cape Upſtart.	5 35
12 38	143 15	4 09
9 46	128 00	0 00
9 45	125 48	1 27W
11 10	119 22	2 44W
Iſland Java.		3 W
23 S.	65 E.	10 00
24 00	58 00	12 00
24 00	51 00	17 00
28 00	46 00	24 20
29 00	43 00	26 10
34 00	27 00	28 15
35 30	23 00	24 00
Cape Anguillas.		22 30
Table Bay C. G. H.		20 30

Lati-

Latitude.	Longitude.	Variation.
° ′	° ′	° ′
70 N	163 24W	30 21 E
69 38	164 11	31 00
66 30	167 55	27 50
65 43	170 34	27 58
63 58	165 48	26 25
59 39	149 08	22 54
58 14	139 19	24 40
55 12	135 00	23 29
53 37	134 53	20 32
50 8	4 40	20 36W
48 44	5 00	22 38
40 41	11 10	22 27
33 45	14 50	18 07
31 08	15 30	17 43
28 30	17 00	14 00
23 54	18 20	15 04
20 30	20 03	14 35
19 45	20 39	13 11
16 37	22 50	10 33
15 25	23 36	9 15
13 32	23 45	9 25
12 21	23 54	9 48
11 51	24 05	8 19
8 55	22 50	8 58
6 29	20 05	9 44
4 23	21 02	9 01
3 45	22 34	8 27
2 40	24 10	7 42
1 14	26 02	5 35
0 51	27 10	4 59
0 07	27 00	4 27
1 13 S	28 58	3 12
2 48	29 37	2 52
3 37	30 14	2 14
4 22	30 29	2 54
5 00	31 40	1 26

Latitude.	Longitude.	Variation.
° ′	° ′	° ′
6 00 S	32 50 W	0 06 W
6 45	33 30	00 35 E
7 50	34 20	0 07 W
8 43	34 20	0 15 W
9 01	34 50	0 44 E
10 04	34 49	0 38 W
12 40	34 49	1 12 E
13 23	34 49	1 01
14 11	34 49	1 09
15 33	34 40	1 15
16 12	35 20	2 04
18 30	35 50	3 02
20 08	36 01	5 26
21 37	36 09	3 24
24 17	36 08	3 24
26 47	34 27	3 44
28 19	32 20	1 58
30 25	26 28	2 37
33 43	16 30	4 44 W
35 37	9 30	5 51
38 52	23 20	2 12
40 36	173 34 E	13 47 E
42 04	167 32	13 17
48 41	69 10	27 39 W

TABLE

TABLE IX.

Declination observed in London at different Times.

Yrs.	Variations.		Yrs.	Variations.	
	° ′			° ′	
1576	11 15	East.	1724	11 45	West.
1580	11 11		1725	11 56	
1612	6 10		1730	13 00	
1622	6 00		1735	14 16	
1633	4 05		1740	15 40	
1634	4 05		1745	16 53	
1657	0 00		1750	17 54	
1665	1 22	West.	1760	19 12	
1666	1 35		1765	20 00	
1672	2 30		1770	20 35	
1683	4 30		1774	21 03	
1692	6 00		1775	21 30	
1700	8 00				
1717	10 42				

TABLE X.

Variation of the Compass observed by Captain Bligh, in 1788.

Latitude.	Longitude.	Variation.
° ′	° ′	° ′
20 44 S	31 15 W	0 00
25 56	36 29	3 00 E
29 38	41 44	7 13
East of Terra del Fuego.		21 23
60 24	75 54	27 09
39 51	26 11	3 07
35 30	5 21	11 35 W
Simon's Bay, C. G. Hope.		22 28
18 47	18 33 E	

Latitude.	Longitude.	Variation.
° ′	° ′	° ′
36 28 S	39 00 E	30 34W
44 16	122 07	6 23
43 56	133 16	1 38E*
Penguin at V. Dieman's.		8 29 E
43 21	147 33	
47 44	179 07	17 00
40 21	145 W	7 45
24 13	131 43	5 19
17 50	147 36	5 00
Iſland Maitia.		5 36
18 50	160	8 14

TABLE XI.

Variation obſerved in 1791.

Latitude.	Longitude.	Variation.
26 14 N	16 40W	19 00W
3 36	17 42	15 30
1 43	20 18	13 30
37 38 S	25 48 E	27 14
37 57	66 05	23 36
38 47	77 15	19 49
40 27	128 35	12 20
43 46	144 40	3 05E
43 21	147 30	4 43
47 44	179 09	13 39
44 31	192 07	10 22
34 42	141 18W	5 52
30 45	136 22	5 51
21 40	143 10	6 00
18 30	178 36 E	11 20
13 27	167 20	10 21
13 43	159 36	10 10
11 36	149 10	7 10
9 27	144 46	6 30

* Capt. Bligh remarked "That in 1780, on board the Reſolution, in Lat. 44°23′ South, Long. 131°28′ Eaſt, the Variation was obſerved 6°00′ W. which is a remarkable difference."

From theſe tables of obſervations of the variation of the compaſs, it appears that it is perpetually changing; ſo that what the variation is this year at London, or any other place, will not be the ſame the next year.

It alſo appears that the variation increaſes for a number of years, and then decreaſes again to nothing, and then changes from eaſt to weſt, and from weſt to eaſt. It is alſo evident, that there are two lines of no variation, the one originating at the northern magnetic vortex, or pole, and proceeding towards the ſouth, which has weſt variation on the eaſt, and eaſt variation the weſt ſide of it. The other line of no variation originates at the ſouthern magnetic vortex, and proceeds towards the north, until it is loſt in the northern one, and has weſt variation on the weſt ſide of it, and eaſt variation on the eaſt.

The next thing to be taken notice of from theſe tables of obſervations will be, to find where theſe lines of no variation, or any one of them was when firſt taken notice of, and to trace it down to the preſent time.

In the year 1638, (*Table* 7.) the line of no variation was obſerved to be at Conſtantinople, which is in the longitude of 28°57′ eaſt from London; at that time there was eaſt variation all over the Mediterranean Sea, as well as at London and Paris (*Tables* 1, and 2); from which it appears, that the

the line of no variation with eaſt variation on the weſt ſide of it, and weſt variation on the eaſt ſide of it, at that time paſſed through Conſtantinople towards the north, keeping to the Eaſt of London and Paris.

By *Tables* 1, 2, and 9, it appears that this line of no variation was obſerved to be at London in the year 1657, and not at Paris until the year 1666. If this really had been the caſe, the lines of no variation at that time would appear to be moving from weſt to eaſt. But if we take into conſideration the variety of obſervations which prove the contrary, we muſt impute this miſtake to the difference in the inſtruments, by which the obſervations were made at London and Paris, at that time; for every man, who is acquainted with nautical affairs, well knows that he can ſeldom get two compaſſes that will perfectly agree for any length of time, but will differ ſometimes four or five degrees. Theſe inſtruments at preſent have got to a very high degree of imperfection, which ſhall be taken notice of in it's proper place. But to proceed:

By *Tables* 1, 2, 3, and 9, it does appear, that the variation has been increaſing at London and Paris, ever ſince the year 1666 (until very late), which would not have been the caſe, if the lines of no variation had advanced from the weſt towards the eaſt; for at Dantzick in the year 1679,

which

which is 19 degrees eaſt from London, the variation was obſerved to be 7 degrees weſt, and at Rome in 1681 the variation was obſerved to be 5 degrees weſt. At London, in the year 1683, which is two years later, the variation was only 4° 30′ weſt; and at Byonne, which is to the weſtward of London, it was 1° 20′ weſt: ſo that it is evident, that the line of no variation, with weſt variation on the eaſt, and eaſt variation on the weſt ſide of it, was at that time to the weſtward of London, and that the increaſe was from the eaſt.

By *Tables* 4, 5, and 6, in about the year 1705, we ſhall find the ſame line of no variation croſſing the equator in, or nearly about the longitude of 20° weſt. In the year 1776, it appears to be to the weſtward of 33° upon the equator (ſee *Table* 8).

On the 18th of February, 1791, Captain Bligh remarked, that "In the courſe of this day's run, the variation changed from weſt to eaſt. According to our reckonings, the true and magnetic meridians coincided in latitude 20°44′ S. and longitude of 31°15′ W."

Alſo in his narrative, page 44, he ſays, "In latitude 44° 16′ S. longitude 122° 07′ E. I obſerved the variation of the compaſs to be 6°23′ weſt. I had no opportunity to obſerve it again till in the latitude 43° 56′, long. 133 °16′E. when it was 1° 38′E. ſo that we had paſſed the line of no variation.

In

In 1780, on board the Reſolution, in latitude 44° 23′ S. and longitude 131° 28′ E. the variation was obſerved 6° 00′ weſt, which is a remarkable difference."

As theſe obſervations were all made in nearly the ſame latitude, it will only be neceſſary to inquire what the difference of longitude was. Now if the variation 6° 23′ W. be added to 1° 38′ E. it will make 8° 01′ for the quantity of variation contained between the longitudes of 122° 07′ and 13° 16′. The difference of theſe longitudes is 11° 09′.

Then as 8° 01′, the quantity of variation, is to 11° 09′ the difference of longitude, ſo is 1° 38′ to 2° 37′ which being ſubtracted from 133° 16′ leaves 130° 39′; or if 2° 37′ be ſubtracted from 11° 09′, the difference of longitude, and the remainder 8° 32′ added to the longitude 122° 07′, it will make 130° 39′ for the line of no variation in the year 1791.

Then as 8° 01′ : 11° 09 :: 6° 00′ : 6° 21′; which being added to 131° 28′ gives 137° 49′ E. longitude for the line of no variation in that latitude, in the year 1780; which makes a difference of 7° 19′ from the eaſt towards the weſt, in eleven years, which is a very great difference indeed in ſuch a ſhort ſpace of time, and inconteſtibly proves that the magnetic poles change their place, and move from eaſt to weſt, but not with any regularity.

Theſe irregularities in the progreſſion of the magnetic poles may be occaſioned by the ſuperior magnetiſm

magnetiſm that all headlands, which are near the the poles, are poſſeſſed of in proportion to the ſea. It may be ſuppoſed that Van Dieman's Land, or ſome iſland to the ſouthward of it,* has retarded the ſouthern magnetic pole in it's progreſs, and has kept it nearly ſtationary for a number of years; for at this time it is about 26° or 30° degrees behind the oppoſite meridian of the northern magnetic pole. However, by Capt. Bligh's obſervations, it appears to be advancing now with conſiderable rapidity, and it may be ſuppoſed that it will continue to do ſo, until it comes in contiguity of ſome land in the South Sea, or perhaps to the meridian of Cape Horn, and there again be ſtationary, or nearly ſo for ſome time. *See Reaſons in Caſe* II.

CASE

* This ſuggeſts to me an idea, that there is a body of land beginning at about the latitude of 70 degrees South, and longitude of about 135 or 140 degrees Eaſt; and ſtretching acroſs towards the latitude of about 75 degrees, and longitude of about 150 degrees Weſt.

CASE IV.

Of the Effect of the Magnetic Effluvia upon the Needle of the Compaſs in all Parts of the Globe, with reſpect to the Variation.

AS there has not hitherto been any method of proving in what manner the magnetic effluvia act upon the magnetic needle or ſteel, any thing that can be ſaid upon it, muſt be partly comparative; of courſe we muſt reſort to the earth, which being in all parts partly compoſed of iron, or ferruginous matter, which is the only *viſible* thing that the magnetic effluvia have any affinity with, or apparently any effect upon, therefore the earth muſt be underſtood to be a magnet; for in fact, every part of it is poſſeſſed of that quality, in proportion to the diſtance from the magnetic poles, that is, the magnetic power of each of theſe poles increaſes as it is approached, and decreaſes as it is receded from. I am alſo of opinion, that every part of the globe, that is compoſed of water, is poſſeſſed of leſs magnetiſm, than that part which is compoſed of earth; therefore all high promontories or headlands that jut far out into the deep ocean, ſuch as Van Dieman's Land, Cape of Good Hope, and Cape Horn, will have a ſuperior magnetic power to the ſeas that are at ſome

ſome diſtance from them, which will be the cauſe of the variation in the vicinity of them, being greater at one time, and leſs at another, than it ought to be, becauſe they will repel that end of the needle, which is poſſeſſed of the ſame ſort of magnetiſm, and attract the oppoſite; for every needle that is made magnetic, when hung at liberty, will turn the end that received the northern polarity to the ſouth, and the end that received the ſouthern polarity to the north.

It is a matter of very little conſequence to us, which ever way the magnetiſm affects the needle: whether the ſmallneſs of it's particles enables it to enter into the iron, and form proper channels for itſelf or not, has not yet been determined.

It is certain that every part of it is poſſeſſed of both polarities; for if it is broke into pieces, each part of it is inſtantly poſſeſſed of a north and ſouth pole, and an equator at nearly equal diſtance from them; and the manner of the magnetic fluid acting upon it, is not more wonderful, than colours being carried through a lens in optics.

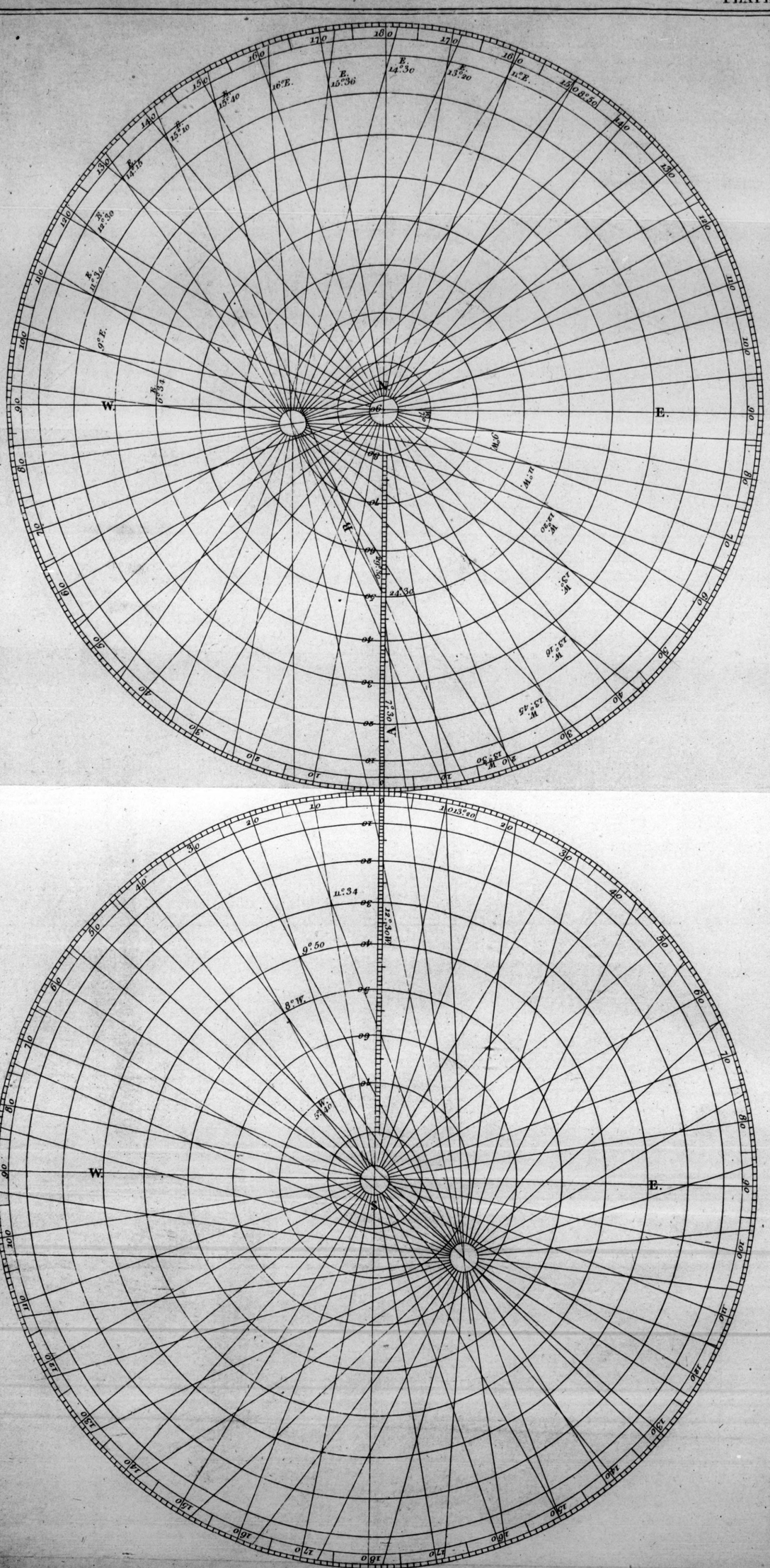
As the polarity of the needle has been, and ſtill is, of the greateſt importance of any diſcovery hitherto made, yet as that polarity in moſt parts of the globe differs from the true pole of the earth, as well as continually changing, it will be neceſſary to explain the cauſe of this phenomenon, and alſo to point out a method of aſcertaining the quantity of that deviation in all latitudes and longi-

tudes at any time; for which purpoſe, ſuppoſe *pl.* 2, to be the north and ſouth hemiſpheres, which are laid down from the chord line of a globe, whoſe diameter is equal E. W. This is neceſſary, that the proper diſtance from the poles may be preſerved at any part upon the meridians. The double lines, marked o. o. is the meridian of London. All the meridians are 10 degrees from each other, and are numbered 10, 20, &c. to 180° eaſt and weſt upon the equator. N. the north pole, S. the ſouth pole.

From the preceding tables of obſervations, the ſouthern magnetic pole is laid down in the latitude of 65°, and longitude of 130° eaſt; the northern one, in latitude 71°, and longitude 80° weſt, from obſervations which I made in July laſt, on board of his Majeſty's ſhip Providence, in her paſſage from Jamaica.

Now ſuppoſe the hemiſpheres are turned round, until the meridian of London coincides at the equator in a ſtrait line, then it will be evident, that the meridian of the magnetic poles will cut the true meridian, at about the latitude of 13° ſouth, which will be the only place upon the meridian of London, where the needle of the compaſs will point to both the magnetic poles; for upon any other latitude farther north or ſouth, it will point to neither, but to each in proportion to their diſtance, and the variation be increaſed accordingly.

Suppoſe



London. Printed for and Published by Ralph Walker of Jamaica, as the Act directs 4th Sept.r 1794.

Jn.o Lodge sculp.t

Suppoſe at London. If the lines A, and B, be drawn from the latitude of $51\frac{1}{2}°$ through the magnetic poles, the angle contained between the true meridian and the line A, will be 7°30′, which being ſubtracted from 12°30′ (the angle at which the magnetic meridian cuts the true meridian, or meridian of London) leaves a difference of 5°, which being ſubtracted from 29°30′ (the angle contained between the true meridian and the line B) will leave 24°30′ for the variation of the compaſs at London.

The variation may be found by theſe hemiſpheres in the ſame manner, for any other latitude and longitude; but as it has already been obſerved, that all headlands, &c. have a very great effect upon the current of magnetic polarity; theſe hemiſpheres will not anſwer with that accuracy that is neceſſary for calculating the variation at all parts of the world, on account of the irregularity of the attraction and repulſion of different parts of it. But if what may be called the ſuperior or permanent magnetiſm of theſe parts be once known, the quantity may be either added to, or ſubtracted from the variation given by theſe hemiſpheres, according to it's quality; for inſtance, upon the eaſt and ſouth of the Peninſula of South America, it appears that the land is poſſeſſed of a very ſuperior magnetic power, which attracts the ſouth end of the magnetic needle, and is the cauſe of the very great oblique in the line of no variation, and at the

the preſent keeps it conſiderably to the eaſtward (in the ſouthern hemiſphere) of what it ought to at this time.

By theſe hemiſpheres, it will be very eaſy to conceive the cauſe of the variation increaſing, or decreaſing more in one 10° of longitude, than in another longitude of the ſame number of degrees; for when the magnetic poles are brought to be in about 90° of eaſt or weſt longitude from any meridian, 10° eaſt or weſt from that meridian will make but very little difference in the angle of meeting of the magnetic, and true meridian; but the reverſe will be (for inſtance) in about the longitude of 70° weſt, where the magnetic poles will be near the ſame meridian, 10° eaſt or weſt, will make a difference in the variation of nearly as much.

CASE

CASE V.

The Dip of the Magnetic Needle.

IN Caſe I. ſome notice was taken of the dip of the needle; but to explain that phenomenon more fully, it will be neceſſary to refer to *pl.* 3, which is laid down upon the ſame principle as *fig.* 3, in *pl.* 1, with reſpect to the quantity of the dip of the needle.

S. and N. the true north and ſouth poles of the earth.

M. and P. centers of the magnetic hemiſpheres. M. the northern one, and is laid down in latitude of about 71°, and longitude of about 80° weſt. P. the ſouthern one, and is in about the latitude of 65°, and longitude of about 130° eaſt.

The double line extending between the true north and ſouth poles, which is divided into degrees, and marked 10, 20, &c. is the meridian of London.

The double line extending between the magnetic poles, is the magnetic meridian, and is divided into degrees, and marked 11, 22, 33, 41, &c. correſponding to the dip of the needle at the different diſtances from theſe poles.

The outſide circle, which is marked 10, 20, &c. to 180° eaſt and weſt, is the equator; the ſmall

ſmall lines correſponding to it and the true poles, are parallels of latitude for every ten degrees.

The black lines, marked A, A, is the magnetic equator; the ſmall lines correſponding to it and the magnetic poles, are parallels of the dip of the needle.

The dip of the needle is the quantity of inclination which one end of the magnetic needle points below the horizon: or, more properly, the angle at which it cuts the horizontal level when ſuſpended, and at liberty to traverſe in the current of the magnetic polarity.

It has been found by experience, after a piece of ſteel, or a needle made for the purpoſe, has been equally divided and ballanced upon it's center, and then made magnetic, that in north latitude, the north end of the needle points below the level of the horizon, and in ſouth latitude, the ſouth end of the needle; that is to ſay, in all latitudes north and ſouth of the magnetic equator.

As at preſent we have not any inſtrument by which the dip of the needle can be aſcertained at ſea with any degree of accuracy, and as no trial has been made with the inſtruments at preſent in uſe, upon any particular meridian of longitude, or upon any of the lines of no variation, for the purpoſe of determining the dip of the needle, we muſt at preſent rely upon ſuch obſervations as have been made tranſiently, in different voyages, which have been performed at different times for different

ent purpoſes, although they are not to be depended upon with any certainty, more particularly as we find by comparing the obſervations made at nearly the ſame place and time, by different navigators, diſagreeing upwards of 20 degrees: however, if we take them upon an average, they will nearly agree with the dip laid down in *pl.* 3, which is upon the principle of *fig.* 3, in *pl.* 1. By this dip we are to underſtand the courſe of the magnetic current of attraction and repulſion with reſpect to the earth, the needle ſtanding nearly in the ſame direction as is repreſented * in *fig. pl.* 1.

When this treatiſe was begun to be written, it was not intended to take any notice of the dip of the needle, as it was not conceived that it could be applied to any uſe in navigation; but as the theory of magnetiſm could not be well explained without it, it has opened a field of information, which it muſt be owned, was not expected.

The firſt thing that attracts particular attention in *pl.* 3, is, that the magnetic equator takes in the whole of the ecliptic, and interſects the true equator in the ſame manner as the zodiac.

The next is, that in the longitudes where the variation of the needle changes the leaſt, the dip changes the moſt; and in the longitudes where the variation changes the moſt, the dip of the needle changes the leaſt.

* By the dotted lines.

Alſo the intermediate circles which correſpond to the magnetic poles, and run parallel to the magnetic equator, ſhew the quantity of dip in all the different latitudes and longitudes through which they run.

If the dip of the needle be wanted to be known for any latitude and longitude, extend the compaſſes from the place, to the neareſt magnetic pole, and turn them from the place to the magnetic meridian, which will ſhew the quantity of dip for that place.

Suppoſe the dip be wanted to be known for the latitude of 15° N. and longitude of 47° W.

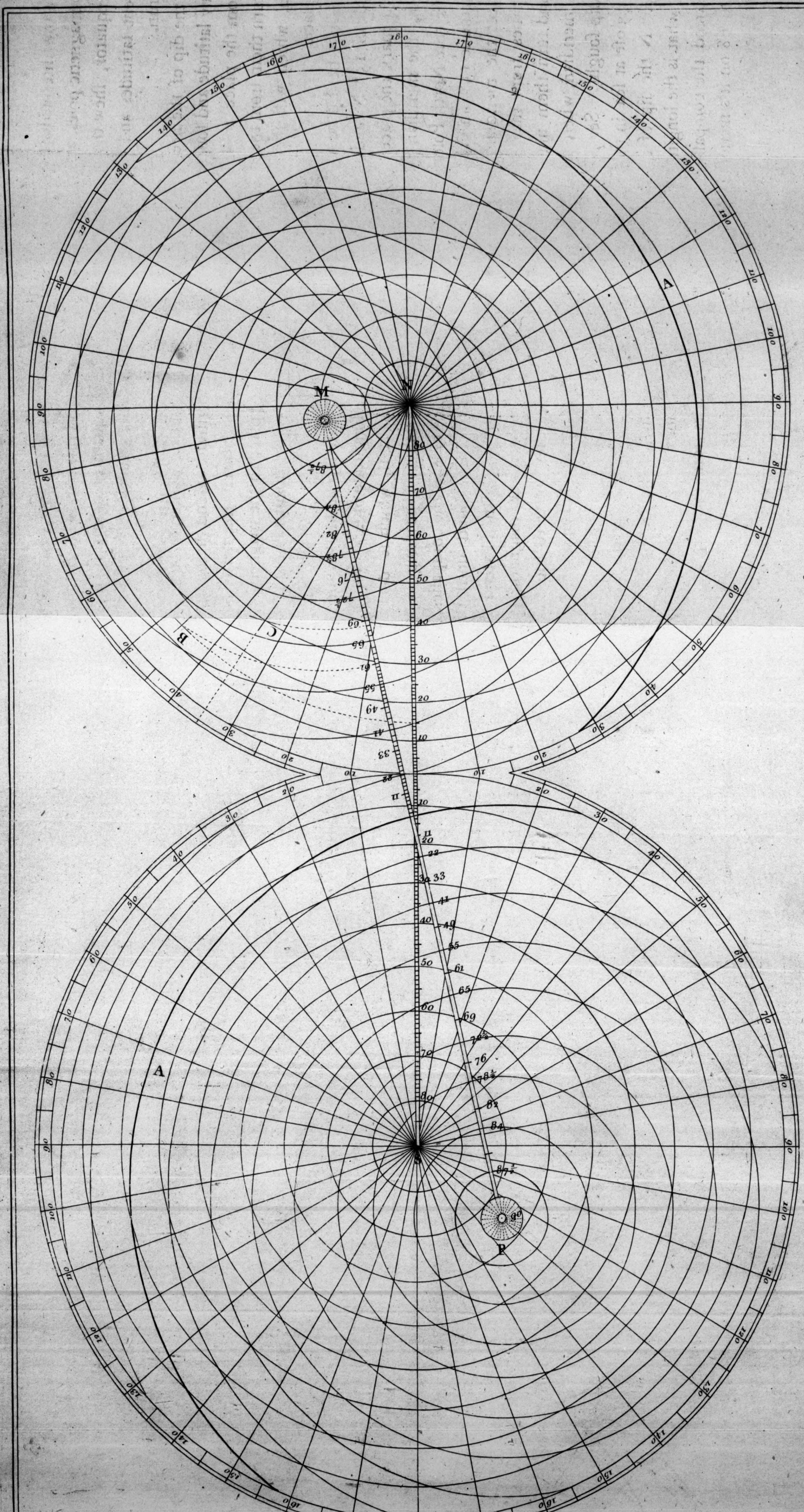
Firſt mark the place as at B, which is done by drawing the meridian from 47° the longitude to N. the true North Pole; extend the compaſſes to the latitude 15°, and turn them round until they interſect the meridian of 47°; then extend the compaſſes from that place to the magnetic pole M. and turn them until they come to the magnetic meridian, where they will fall upon 61° for the dip ſought. See *pl.* 3.

Suppoſe at ſea in the Atlantic, in the latitude of 30° N. the dip of the needle be found to be 68°, what is the longitude?

Extend the compaſſes from the magnetic pole M, to 68 on it's meridian, and turn them until they interſect the parallel 30 of latitude, which will be at C, or about 35° weſt for the longitude.

Nothing ſhews the Supreme Architect in a more exalted

PLATE III.



Jno. Lodge sculp.

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exalted point of view, than the ſimplicity of his works, and that they may be all made ſubſervient to our uſe, when once we have got a juſt conception of them; but more particularly the ſubject of which we are treating. By it He enables us to behold his works, and our fellow creatures, in all the different corners of the world, from the moſt uncultivated ſtate of nature, to the moſt improved and poliſhed in manners; to colonize and carry on commerce for our benefit and happineſs, ſtirring up our minds to activity and induſtry; above all, expanding our ideas, and giving us a juſt ſenſe of his greatneſs and government of this world, filling our hearts with gratitude and adoration for his goodneſs in placing us over all his other creatures in it.

I hope that I ſhall be excuſed for this ſhort digreſſion, it being only the reſult of my feeling, when I conceived that the longitude might be found by magnetiſm (with the improvements which I have made upon it) without any trouble or calculation, and with as much certainty at ſea, as any other way now in uſe; which ſhall be more fully taken notice of after a deſcription of what my improvements are.

Upon the foregoing principles I have calculated my tables of the variation of the compaſs, for the Atlantic ocean, or from the equator to the latitude of 60° N. and from the meridian of London, to the longitude of 90° W. for every ſe-

cond degree of latitude, and every degree of longitude. Tables of the ſame ſort for the ſouthern hemiſphere will be calculated and publiſhed as ſoon as time and circumſtances will permit.

If the magnetic poles moved with any regularity from eaſt to weſt, or from weſt to eaſt, theſe tables would be perpetual; for if the magnetic poles in twenty years changed their places 10° to the weſtward, it is evident that the whole of the magnetic meridians would be carried round alſo; ſo that the variation which is at London at this preſent time, would in the year 1813 be found 10° to the weſtward, and the variation which is now in longitude of 10° eaſt, would then be at London. By the ſame rule, the preſent tables may be continued without being recalculated. Although it is very clear from the preceding tables of obſervations, that the magnetic poles change their places from eaſt to weſt; yet it does not appear that either of them does ſo with a ſteady uniform motion, but the reverſe; the northern magnetic pole having receded from the European continent, to the continent of America, in a very ſhort time, but is now more ſtationary; the one to the ſouth has for a long time been ſtationary to the ſouth of, or at the meridian of Van Dieman's Land, but is at preſent receding from it to the weſt, at the rate of about 42′ in the year. See Bligh's obſervations.

As

As we can only judge of the future by the time paſt, it does not appear poſſible that any fixed period of time can be determined upon for a revolution of either of the magnetic poles; therefore candour will not permit me to ſay, that theſe tables of the variation may be depended upon for any conſiderable time. However that is a matter of very little conſequence, as the principle upon which they are calculated is very plain and ſimple, they may be reviſed every third or fourth year, according as it may be found from obſervations (taken in high latitudes) that the magnetic poles change their meridians of longitude.

From the tables of the variation of the compaſs it is plain, that if the latitude and longitude of any place be known, the variation may be found in them. On the left hand ſide of the tables find the latitude, and on the top the longitude, and in the common angle of meeting will the variation of the compaſs at that place be found.

If the latitude and variation are known in any quarter of the globe, find the latitude as before, and in that parallel of latitude the variation, and right over it on the top of the table will be found the longitude of that place.

It may be objected, that little dependance can be placed in theſe tables for finding the longitude, becauſe the variation can only be obtained with

with any tolerable degree of accuracy in the mornings and evenings; and in our Channel in the months of December, January, and February, the ſun is ſeldom ſeen until nine or ten o'clock A. M. which is too late for taking an azimuth. That when the ſun is to be ſeen, very often the horizon is not to be got, and even then it varies according to the denſity of the atmoſphere; that the beſt of compaſſes differ conſiderably; that the amplitudes are but momentary, and the oblique angle that the ſun's courſe cuts the horizon at, ſo great, in all high latitudes, that they are not to be depended upon; that an error in ſetting down a figure in the calculations, &c. are objections that hold good with reſpect to the preſent mode of obtaining the variation at ſea, by the compaſs in preſent uſe.

But to obviate all theſe objections, I have conſtructed an inſtrument which exactly ſhews the variation of the compaſs at any time of the day, from ſix o'clock in the morning until ſix in the evening, when the ſun is viſible, without any calculation whatever, upon the following aſtronomical principles; ſee *plate* 4.

Plate 4 repreſents an upper hemiſphere of the globe cut horizontally north and ſouth, and inverted or turned outſide in. The degrees are marked upon the outſide rim, from the equator to the poles. The ecliptic is marked with lines parallel

to

to the equator for every degree from it, to 23½ north and ſouth. The oblique line marked with the ſigns, repreſents the zodiac. I. The axis or poles. The meridan lines are each 15° diſtant from each other, which ſhews the ſun's place in the ſigns, &c.

The inſtrument is conſtructed upon the principles of this plate, and fixed to the upper part of a compaſs-box, with their points north and ſouth, &c. parallel to each other; the ſolar part is ſo contrived that it always has a level with the horizon.

Suppoſe the inſtrument be placed upon the equator on the 21ſt day of March, or when the ſun has no declination, at ſix o'clock in the morning; turn it until the ray of the ſun paſſing through the hole in the center of the axis falls upon the weſt end of the line marked Æ or the equator, the inſtrument will then be exactly with it's axis north and ſouth, and whatever the needle differs from it, is the variation at that place. If the inſtrument is kept in the ſame poſition all that day, the ray of the ſun at B, will fall upon the equator until it ſets at A, except ſo much as the difference of declination at that time for twelve hours, which would not be the caſe if the inſtrument was not placed with it's poles exactly north and ſouth.

When the ſun has 10° of ſouth declination, at ſix

ſix o'clock in the morning, the ray of the ſun at F paſſing through the hole in the axis, will fall upon the 10th° on the north ſide of the equator in the inſtrument, and keep upon that parallel until ſix o'clock P. M. when the ſun will be at E.

On the 21ſt day of June, or when the ſun has greateſt north declination at ſix o'clock A. M. the ray of the ſun from H paſſing through the hole in the ſlider, when it is at Æ in the axis, will fall upon the ſouth ſide of the ecliptic, or the line of $23\frac{1}{2}°$, and will keep upon it until ſix o'clock in the evening, if the inſtrument is not moved from the true ſouth and north.

It is evident, that if the degrees of declination be transferred to the axis, the ſlider may be moved to the declination upon it, and the ray of the ſun will then fall upon the equator; ſee G and H.

If in any other latitude, either ſouth or north, elevate the correſponding pole equal to the number of degrees of the latitude of the place, and the variation will be found as before.

But that the inſtrument may be the more ſimplified, as well as that the compaſs connected with it, may be more expoſed to view, the ſolar part is made as repreſented in *plate* 5, which is laid down from *plate* 4. A and B ſhew the rays of the ſun falling upon the equator at nine o'clock in the morning, and 3 in the afternoon, on the

21ſt

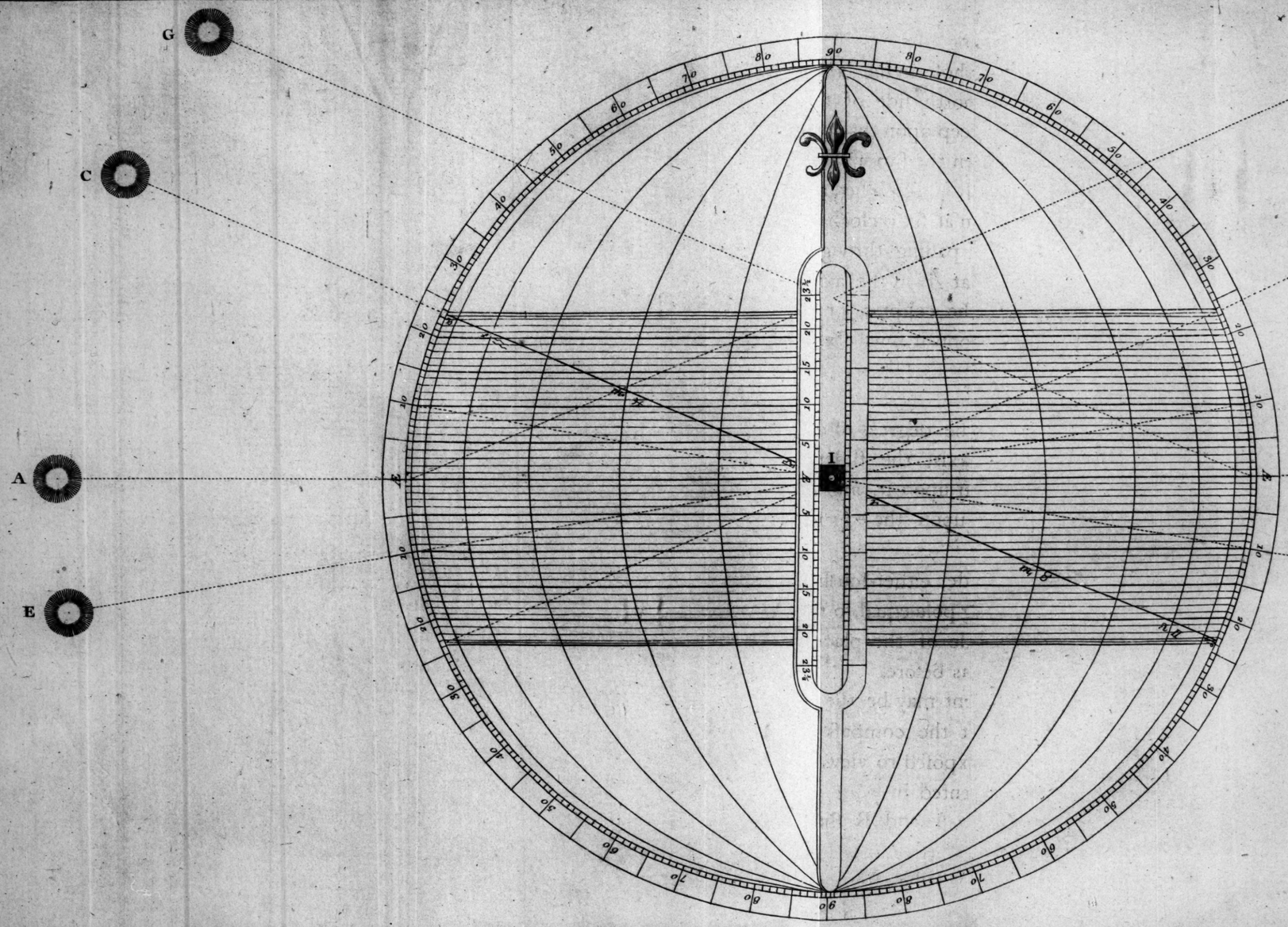

PLATE IV.

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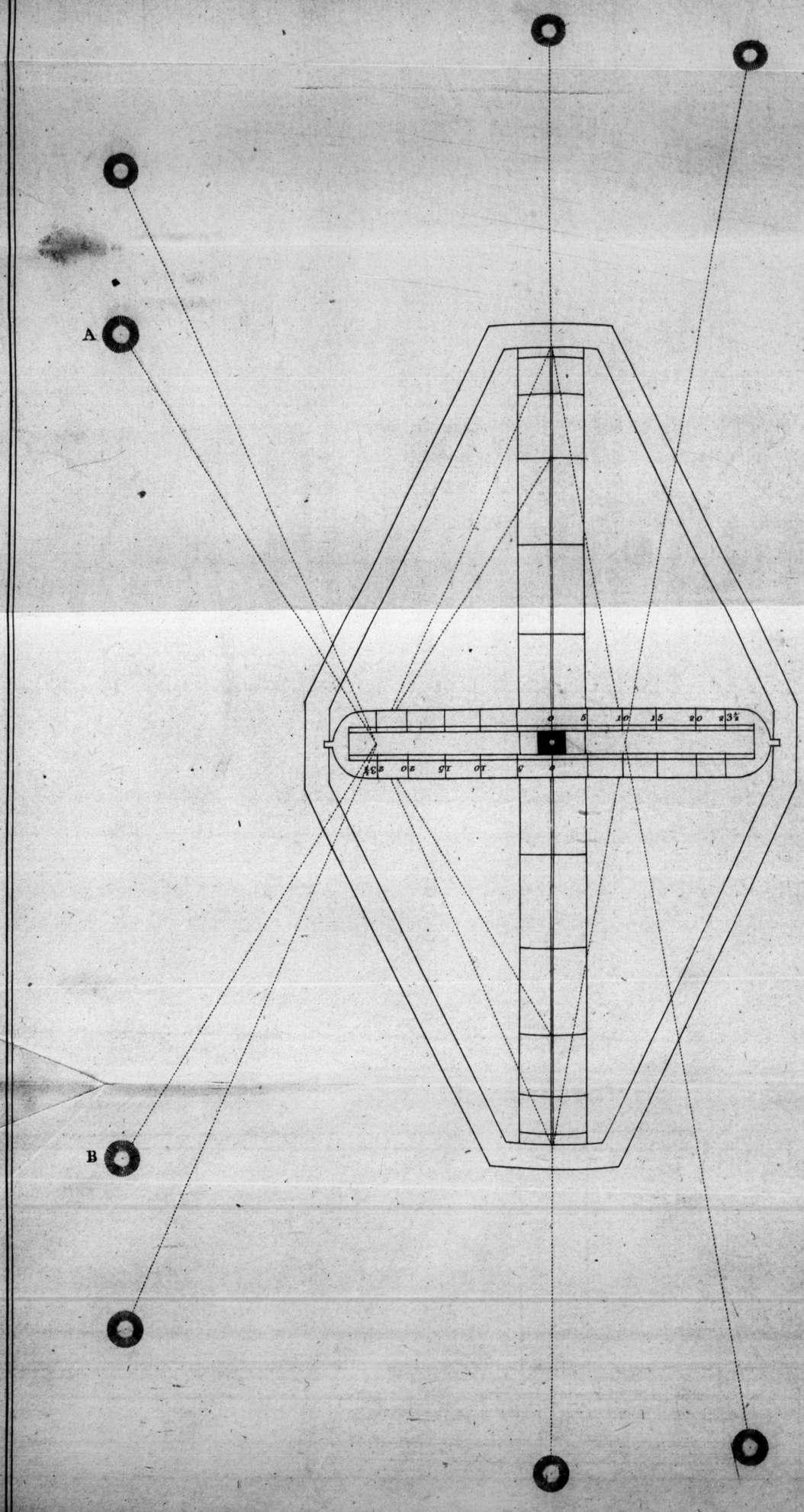
PLATE V.



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21ſt of June. The difference in *pl.* 5 is, that degrees of declination are removed from the ecliptic to the pole or axis.

The utility of the invention of an inſtrument for obtaining the variation of the compaſs at any time of the day, at one view without any calculation, muſt be very obvious, when it is conſidered that there are ſome ſhips (even in foreign voyages) which have not one man on board that can calculate an azimuth, and that in coming from the weſtward in the beginning of the year, on entering the chops of the Engliſh channel, an azimuth is ſeldom to be got on account of the hazineſs of the weather, which prevents the ſun from being ſeen only at times, and then but for a very ſhort ſpace, about nine or ten o'clock in the forenoon, which is too late for an azimuth; it ought alſo to be taken notice of that an azimuth ought to be taken very frequently on making land in all high latitudes, where the variation is very great and changeable, particularly in making the Land's-End of England.

In the latitude of 51° north, and longitude of about 14° weſt, the variation is at this time about 26° 30′ weſt. In the ſame latitude and longitude of Cape Clear, the variation is 26° weſt. About 4 leagues ſouth of Scilly, the variation is 24° 40′ W. Culver-Cliff north 5 or 6 leagues, variation 21° W. Beachy-Head N. N. W. 4 or 5 leagues, variation 20° W. Dungeneſs

north 3 leagues, variation 19° 50′ W. Dover north one mile, variation 22° W. In the Downs, variation 20° W. At the Girdler-Buoy in the nob channel, variation 23° W. Yet although the variation is ſo high to the weſtward of the Land's-End, there are but few who navigate thoſe ſeas, that allow more than two points, which certainly is the cauſe of many of them getting upon the rocks of Scilly, or to the north of them; but in going up channel, more is allowed than the variation is at preſent, the variation having conſiderably decreaſed there for upwards of twenty years paſt, which certainly is the cauſe of many ſhips getting upon the Goodwin-Sands in very thick weather, in place of coming ſafe into the Downs.

Many of theſe misfortunes are no doubt owing to the want of confidence in the compaſſes uſed at ſea, as very few of them are to be depended upon after a long voyage.

As I have frequently mentioned theſe imperfections, it is now neceſſary that they ſhould be pointed out.

It is well known, that there is no poſſibility of fixing the magnetic polarity with any certain permanency in the beſt of the magnetic needles, as they are liable to have their poles changed altogether, either by lightning, or by lying near to, or touching a magnet in the contrary direction that it received the polarity. Theſe effects are in proportion

proportion to the temper of the ſteel of which they are made. Steel that is very hard tempered receives the polarity with more obſtinacy, but retains it much longer than that which is ſoft; this being the caſe, it is evident that the needles uſed in ſhip compaſſes are very improperly conſtructed.

Plate 5, *figure* 1 and 2 repreſent upper views of them. The needles are in general about one tenth of an inch thick, and upwards of half an inch broad, and are hung in the box with the flat ſide up.

Suppoſe the needle in *figure* 1 to be newly touched, and to have the N. eaſt corner ſomething harder than the other parts of it; the N. weſt corner being ſoft, will at firſt be more ſtrongly magnetic, and the needle will not point to the magnetic poles, but as in *figure* 1, 4° to the eaſtward of it. Mechanics in general pay very little reſpect to the poſition of the needle, but fix the card over it with it's points north and ſouth, true with the magnetic poles. From what has been ſaid before, viz. that ſoft ſteel loſes it's polarity much ſooner than hard ſteel, of courſe the needle will in time ſtand as in *figure* 2, which will make a difference of at leaſt eight degrees in one compaſs at different times. It is alſo a fact well known, that if the needles of compaſſes ſhould happen to be placed near to iron, in an oblique direction for any length of time, the current of polarity will become oblique in the

needle, as is repreſented by the ſhaded parts of them in *figure* 1 and 2. There are other reaſons why the ſtrongeſt polarities will always be at oppoſite corners, or at greateſt diſtance from each other. (See Theory, Caſe II.)

The compaſs-boxes, as well as the needles, are alſo very improperly hung, in what at preſent is called the moſt improved of them; (ſee *fig.* 3.) the point of the pivot that ſupports the needle, being ſo far above it and the card, gives a pendulous motion to them; the pivots, upon which the box is hung in the jimbols, are alſo very conſiderably above the point of ſuſpenſion of the needle, which increaſes the pendulous motion of the whole, as may be conceived by the dotted lines.

Theſe are the cauſes why navigators cannot depend upon the courſes which they ſteer, nor aſcertain the quantity of the magnetic deviation from the true north and ſouth at any part, as well as account for ſhips in a fleet all ſteering different courſes, &c. &c.

There can be nothing more ſimple than to remedy theſe errors in this very uſeful inſtrument, (ſee *fig.* 4 and 5.) *Figure* 4 is an upper view of the compaſs-box and needle, with the thin edge of the needle up, in place of the flat ſide, as will appear more plain by the ſection, *figure* 5.

Upon theſe principles I have conſtructed my compaſſes; and if it be admitted as an invariable law of nature, that there can be but one current

of

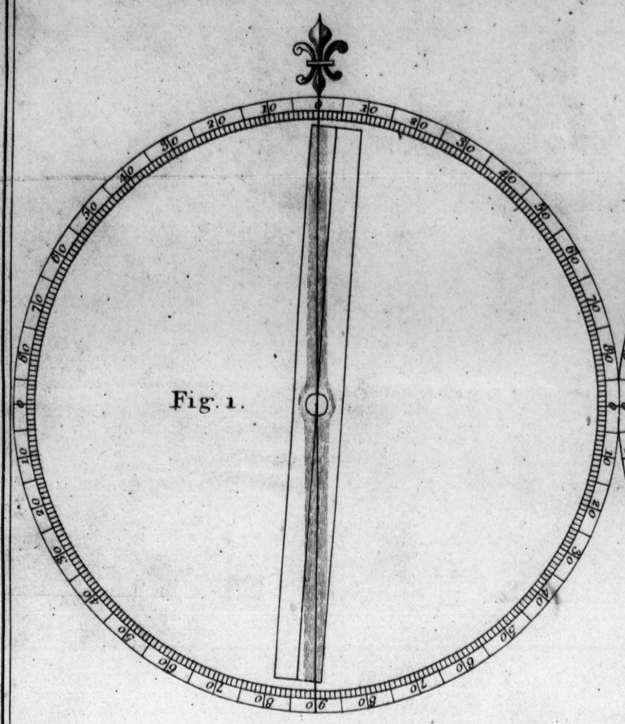

Fig. 1.

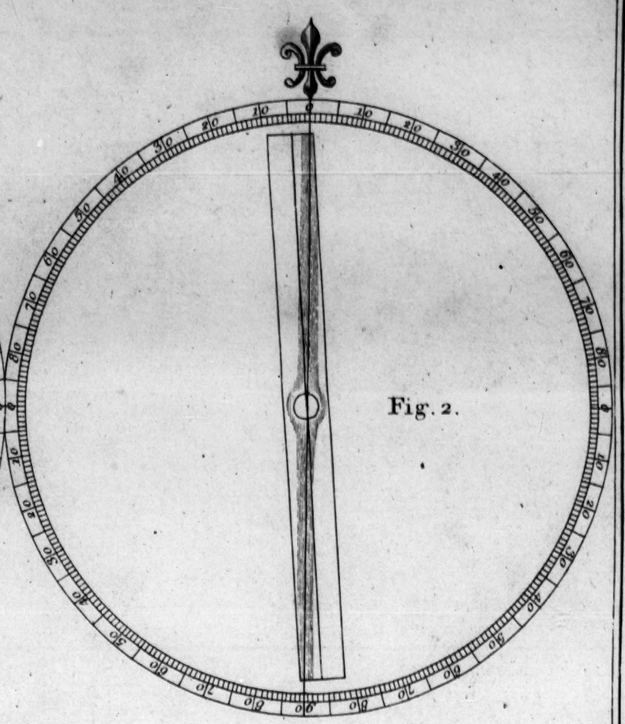

Fig. 2.

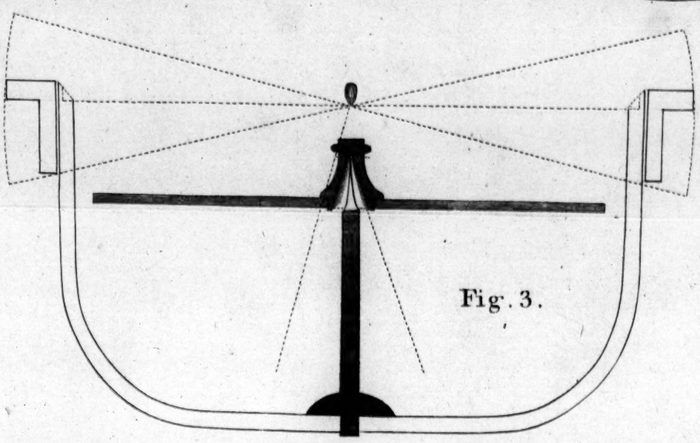

Fig. 3.

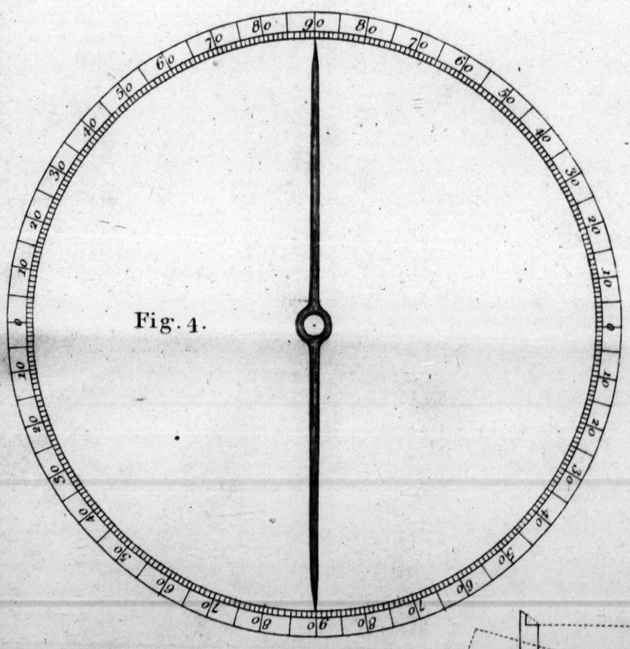

Fig. 4.

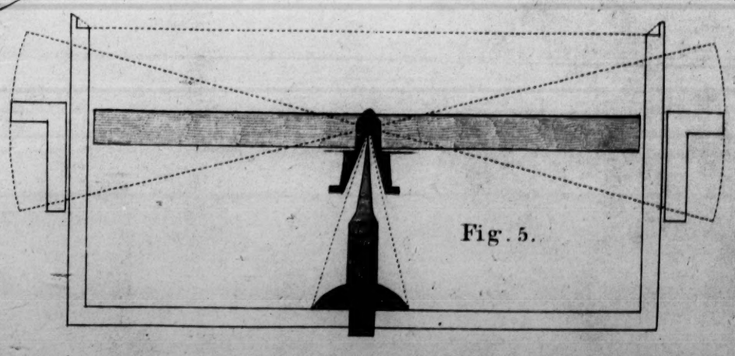

Fig. 5.

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of magnetic attraction at any one place, it muſt alſo be admitted as an impoſſibility, that there can be any difference between any two, or any number of compaſſes made upon this principle, becauſe the horizontal ſurface of the needle will not admit of room for any material derangement of the magnetic polarity. (See the inſtrument.)

TABLES

TABLES OF VARIATION,

BY CALCULATION.

These Tables contain the variation of the compass, from the equator to the latitude of 60° north, and from the meridian of London to the longitude of 90° west. The latitude is marked on the left hand side of the pages, for every second degree, and the longitude on the top for every degree.

The variation for any latitude and longitude is found in the Tables, in the common angle of meeting.

When the latitude is in odd degrees, add the variation under and over the latitude, and their mean will be the variation.

To find the Longitude by the Tables.

Suppose in the latitude of 34° 00′ north, and longitude west from the meridian of London, the variation to be observed 10° 00′ W. what is the longitude in?

Enter the Tables with the latitude, and look to the right, until the variation is found, which will be under 47°, for the longitude of that place.

Longitude West.——Variation West.

Lat. North.		1	2	3	4	5	6	7	8	9
	° ′	° ′	° ′	° ′	° ′	° ′	°	° ′	° ′	° ′
0	13 00	12 54	12 48	12 42	12 36	12 30	12 24	12 17	12 10	12 03
2	13 05	13 03	13 02	12 50	12 44	12 39	12 34	12 29	12 24	12 29
4	13 10	13 06	13 05	12 58	12 54	12 50	12 46	12 42	12 38	12 34
6	13 15	13 12	13 09	13 06	13 03	13 00	12 57	12 54	12 52	12 50
8	13 20	13 19	13 18	13 16	13 14	13 12	13 10	13 08	13 06	13 04
10	13 30	13 30	13 30	13 30	13 29	13 28	13 27	13 26	13 25	13 24
12	13 40	13 41	13 42	13 43	13 43	13 44	13 44	13 44	13 44	13 43
14	14 04	14 05	14 06	14 08	14 09	14 08	14 07	14 06	14 04	14 02
16	14 30	14 41	14 32	14 32	14 31	14 30	14 29	14 28	14 26	14 24
18	14 54	14 55	14 56	14 56	14 55	14 54	14 58	14 52	14 50	14 48
20	15 20	15 21	15 22	15 23	15 22	15 21	15 20	15 18	15 16	15 14
22	15 40	15 41	15 42	15 43	15 44	15 43	15 42	15 40	15 38	15 36
24	16 00	16 02	16 04	16 06	16 08	16 06	16 04	16 02	16 00	15 58
26	16 26	16 27	16 28	16 28	16 28	16 27	16 24	16 20	16 16	16 14
28	16 54	16 55	16 56	16 57	16 57	16 50	16 45	16 40	16 35	16 32
30	17 24	17 25	17 26	17 26	17 24	17 20	17 15	17 09	17 04	17 00
32	17 56	17 58	18 02	18 04	18 04	17 57	17 50	17 42	17 36	17 30
34	18 28	18 30	18 32	18 34	18 36	18 33	18 29	18 26	18 22	18 18
36	19 00	19 02	19 04	19 08	19 08	19 10	19 10	19 10	19 10	19 10
38	19 42	19 44	19 46	19 48	19 49	19 50	19 51	19 52	19 52	19 52
40	20 24	20 26	20 28	20 29	20 30	20 31	20 32	20 33	20 34	20 36
42	21 00	21 02	21 04	21 06	21 08	21 12	21 16	21 18	21 20	21 22
44	21 36	21 40	21 44	21 48	21 50	21 52	21 54	22 00	22 06	22 12
46	22 12	22 27	22 32	22 36	22 38	22 40	22 42	22 44	22 46	22 50
48	22 50	22 55	23 00	23 05	23 10	23 14	23 18	23 22	23 26	23 30
50	23 30	23 40	23 50	23 58	24 06	24 13	24 20	24 27	24 34	23 42
52	24 10	24 19	24 28	24 36	24 44	24 52	25 00	25 10	25 20	25 30
54	25 12	25 20	25 28	25 35	25 42	25 49	25 56	26 03	26 10	26 16
56	26 00	26 10	26 20	26 30	26 38	26 46	26 54	27 02	27 10	27 18
58	26 40	26 48	26 56	27 04	27 10	27 16	27 22	27 28	27 34	27 40
60	27 06	27 16	27 26	27 36	27 46	27 56	28 06	28 16	28 26	28 36

Longitude

Longitude West.——Variation West.

Lat. North.	10	11	12	13	14	15	16	17	18	19
	o ′	o ′	o ′	o ′	o ′	o ′	o ′	o ′	o ′	o ′
0	11 56	11 50	11 36	11 36	11 28	11 20	11 12	11 04	10 56	10 48
2	12 24	12 15	12 06	11 57	11 47	11 37	11 27	11 19	11 11	11 03
4	12 30	12 22	12 14	12 06	11 58	11 50	11 42	11 34	11 26	11 18
6	12 48	12 40	12 32	12 24	12 15	12 06	11 57	11 49	11 41	11 33
8	13 02	12 54	12 46	12 38	12 30	12 21	12 12	12 04	11 56	11 48
10	13 23	13 16	13 09	13 02	12 55	12 48	12 40	12 31	12 22	12 13
12	13 42	13 37	13 32	13 27	13 22	13 16	13 10	13 02	12 53	12 44
14	14 00	13 54	13 48	13 42	13 36	13 30	13 23	13 15	13 05	12 57
16	14 22	14 15	14 08	14 01	13 53	13 44	13 36	13 30	13 24	13 18
18	14 46	14 39	14 32	14 25	14 18	14 11	14 04	13 56	13 48	13 42
20	15 12	15 05	14 58	14 51	14 44	14 37	14 30	14 24	14 18	14 12
22	15 34	15 29	15 23	15 17	15 12	15 06	15 06	14 53	14 46	14 39
24	15 56	15 50	15 46	15 42	15 38	15 34	15 30	15 23	15 16	15 09
26	16 12	16 10	16 08	16 06	16 03	15 58	15 55	15 50	15 45	15 40
28	16 30	16 28	16 26	16 24	16 22	16 20	16 18	16 15	16 11	16 07
30	16 59	16 58	16 57	16 56	16 55	16 54	16 52	16 50	16 47	16 44
32	17 26	17 28	17 30	17 32	17 34	17 34	17 34	17 32	17 30	17 27
34	18 16	18 18	18 20	18 22	18 20	18 20	18 17	18 14	18 10	18 06
36	19 10	19 12	19 14	19 16	19 10	19 05	19 00	18 55	18 50	18 45
38	19 53	19 54	19 55	19 55	19 55	19 55	19 54	19 52	19 49	19 45
40	20 38	20 38	20 40	20 42	20 46	20 48	20 48	20 44	20 38	20 30
42	21 24	21 36	21 48	22 00	21 58	21 58	21 54	21 48	21 40	21 30
44	22 18	22 36	22 54	23 12	23 12	23 06	23 00	22 57	22 50	22 40
46	22 54	23 06	23 18	23 30	23 45	23 40	23 35	23 28	23 20	23 10
48	23 34	23 46	23 56	24 06	24 16	24 16	24 10	24 02	23 52	23 44
50	23 56	24 25	24 50	25 10	25 25	25 25	25 20	25 12	25 04	24 54
52	25 40	25 55	26 12	26 28	26 40	26 36	26 30	26 22	26 12	26 00
54	26 24	26 34	26 44	26 54	27 04	27 04	27 00	26 56	26 50	26 46
56	27 36	27 40	27 46	27 52	27 56	28 00	23 00	27 58	27 54	27 46
58	27 48	28 00	28 10	28 20	28 30	28 40	23 50	28 50	28 46	28 40
60	28 46	28 53	29 00	29 07	29 14	29 21	29 28	29 30	29 30	29 28

Longitude

Longitude West.——Variation West.

Lat. North.	20	21	22	23	24	25	26	27	28	29
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
0	10 40	10 32	10 24	10 15	10 06	9 53	9 42	9 31	9 20	9 09
2	10 56	10 48	10 41	10 31	10 21	10 11	10 01	9 51	9 41	9 31
4	11 10	11 02	10 53	10 44	10 36	10 26	10 16	10 06	9 56	9 46
6	11 25	11 17	11 08	11 00	10 51	10 41	10 31	10 21	10 11	10 01
8	11 40	11 32	11 23	11 14	11 06	10 57	10 48	10 39	10 30	10 20
10	12 04	11 57	11 47	11 36	11 25	11 16	11 07	10 58	10 49	10 40
12	12 32	12 20	12 08	11 56	11 44	11 35	11 26	11 17	11 08	10 59
14	12 48	12 40	12 32	12 24	12 16	12 04	11 50	11 37	11 24	11 11
16	13 12	13 06	13 00	12 56	12 48	12 34	12 20	12 06	11 52	11 38
18	13 36	13 30	13 24	13 18	13 12	12 59	12 46	12 33	12 20	12 06
20	14 06	13 59	13 52	13 45	13 36	13 23	13 10	12 47	12 34	12 21
22	14 32	14 25	14 18	14 12	14 07	13 53	13 39	13 25	13 11	12 57
24	15 02	14 55	14 48	14 43	14 38	14 23	14 08	13 58	13 38	13 23
26	15 35	15 30	15 25	15 17	15 09	14 56	14 43	14 30	14 16	14 02
28	16 02	15 57	15 52	15 47	15 40	15 30	15 16	15 00	14 43	14 26
30	16 40	16 35	16 30	16 24	16 17	16 06	15 50	15 35	15 18	15 00
32	17 24	17 18	17 10	17 02	16 54	16 44	16 30	16 14	15 56	15 38
34	18 02	17 55	17 48	17 40	17 32	17 20	17 06	16 50	16 34	16 18
36	18 40	18 33	18 26	18 18	18 10	18 00	17 44	17 30	17 12	16 54
38	19 37	19 27	19 15	19 05	18 55	18 40	18 24	18 08	17 50	17 32
40	20 20	20 10	20 00	19 50	19 40	19 26	19 10	18 54	18 38	18 20
42	21 19	21 07	21 54	21 43	20 33	20 20	20 07	19 54	19 41	19 28
44	22 28	22 16	22 04	21 49	21 26	21 13	21 00	20 46	20 32	20 18
46	23 00	22 49	22 38	22 26	22 13	21 58	21 43	21 28	21 13	20 58
48	23 36	23 27	23 18	23 09	23 00	22 45	22 30	22 15	22 00	21 45
50	24 42	24 30	24 18	24 04	23 50	23 37	23 24	23 10	22 56	22 42
52	25 47	25 33	25 20	25 05	24 50	24 37	24 24	24 10	23 56	23 42
54	26 40	26 32	26 24	26 15	26 06	25 52	25 38	25 24	25 10	24 56
56	27 36	27 25	27 13	27 02	26 50	26 39	26 28	26 17	26 06	25 55
58	28 30	28 18	28 06	27 56	27 46	27 34	27 22	27 10	26 58	26 44
60	29 20	29 09	28 58	28 46	28 34	28 23	28 11	28 00	27 48	27 36

Longitude West.——Variation West.

Lat. North.	30	31	32	33	34	35	36	37	38	39
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
0	8 58	8 47	8 36	8 19	8 00	7 41	7 22	7 02	6 42	6 22
2	9 21	9 08	8 55	8 36	8 19	8 00	7 40	7 20	7 01	6 41
4	9 36	9 24	9 13	8 44	8 25	8 21	7 56	7 38	7 20	7 00
6	9 51	9 41	9 31	9 12	8 53	8 43	8 13	7 56	7 38	7 18
8	10 10	10 00	9 50	9 31	9 12	8 53	8 34	8 15	7 56	7 36
10	10 30	10 20	10 10	9 51	9 32	9 13	8 54	8 35	8 15	7 55
12	11 00	10 45	10 30	10 11	9 52	9 33	9 14	8 55	8 36	8 16
14	11 24	11 10	10 57	10 39	10 21	10 03	9 45	9 27	9 09	8 50
16	11 52	11 38	11 24	11 07	10 50	10 33	10 16	9 58	9 40	9 22
18	12 08	12 00	11 50	11 33	11 16	10 59	10 42	10 25	10 08	9 50
20	12 43	12 29	12 16	12 00	11 43	11 26	11 09	10 52	10 35	10 08
22	13 08	12 58	12 48	12 31	12 14	11 57	11 40	11 23	11 05	10 47
24	13 48	13 34	13 20	13 02	12 44	12 26	12 08	11 50	11 32	11 14
26	14 08	13 54	13 42	13 25	13 08	12 51	12 34	12 16	11 58	11 40
28	14 42	14 26	14 04	13 47	13 30	13 13	12 56	12 38	12 20	12 02
30	15 23	15 03	14 43	14 26	14 09	13 52	13 35	13 18	13 00	12 41
32	16 00	15 41	15 22	15 04	14 46	14 28	14 10	13 52	13 34	13 16
34	16 34	16 14	15 55	15 37	15 19	15 01	14 42	14 24	14 06	13 48
36	17 16	17 00	16 44	16 24	16 04	15 44	15 24	15 04	14 44	14 22
38	18 02	17 40	17 22	17 02	16 42	16 22	16 02	15 41	15 20	14 59
40	18 40	18 20	18 00	17 40	17 20	17 00	16 40	16 19	15 58	15 37
42	19 14	19 02	18 48	18 27	18 06	17 45	17 24	17 03	16 42	16 22
44	20 04	19 50	19 36	19 17	18 58	18 39	18 20	18 00	17 40	17 20
46	20 43	20 28	20 20	19 54	19 36	19 18	19 00	18 42	18 13	17 55
48	21 30	21 15	21 00	20 42	20 24	20 06	19 48	19 30	19 12	18 51
50	22 28	22 16	22 00	21 40	21 20	21 00	20 40	20 19	19 58	19 37
52	23 28	23 14	23 00	22 39	22 18	21 57	21 36	21 15	20 54	20 33
54	24 42	24 23	24 12	23 55	23 38	23 21	23 04	22 47	22 30	22 14
56	25 44	25 33	25 22	25 05	24 48	24 30	24 12	23 54	23 36	23 18
58	26 30	26 17	26 06	25 48	25 30	25 12	24 54	24 36	24 18	23 59
60	27 24	27 12	27 00	26 43	26 26	26 09	25 52	25 34	25 16	24 58

Longitude West.——Variation West. | V. East.

Lat. North.	40	41	42	43	44	45	46	47	48	49
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
0	6 00	5 15	4 30	3 45	3 00	2 15	1 30	0 45		0 45
2	6 19	5 37	4 55	4 13	3 30	2 45	2 00	1 15	0 30	
4	6 36	6 00	5 20	4 39	4 00	3 15	2 30	1 45	1 00	0 20
6	6 55	6 20	5 44	5 08	4 30	3 48	3 06	2 24	1 42	1 12
8	7 16	6 32	5 58	5 24	5 00	4 21	3 42	3 03	2 24	1 44
10	7 36	7 04	6 32	6 00	5 28	4 51	4 14	3 37	3 00	2 23
12	7 56	7 26	6 56	6 26	5 56	5 21	4 46	4 11	3 36	3 02
14	8 30	8 00	7 28	6 00	6 24	5 51	5 18	4 35	4 11	3 37
16	9 04	8 32	8 00	7 28	6 54	6 21	5 48	5 14	4 40	4 06
18	9 32	9 00	8 27	7 57	7 25	6 53	6 20	5 46	5 15	4 41
20	10 00	9 30	9 00	8 30	7 56	7 25	6 54	6 22	5 50	5 18
22	10 28	9 58	9 28	8 58	8 28	8 00	7 32	7 04	6 25	6 00
24	10 56	10 27	9 58	9 29	9 00	8 30	8 00	7 30	7 00	6 30
26	11 22	10 54	10 26	9 58	9 30	9 00	8 28	7 57	7 25	6 54
28	11 48	11 22	10 56	10 28	10 00	9 28	8 56	8 24	7 50	7 18
30	12 22	11 55	11 28	11 00	10 32	10 00	9 28	8 56	8 22	7 50
32	12 56	12 28	12 00	11 32	11 04	10 32	10 00	9 28	8 54	8 22
34	13 28	13 00	12 33	12 05	11 37	11 05	10 38	10 01	9 29	8 58
36	14 00	13 33	13 06	12 38	12 10	9 39	9 08	8 36	10 04	9 32
38	14 38	14 11	13 44	13 17	12 50	12 26	11 54	11 22	10 42	10 10
40	15 16	14 50	14 24	13 56	13 30	12 58	12 26	11 53	11 20	10 47
42	16 08	15 48	15 28	15 27	14 47	14 06	13 25	12 44	12 12	11 21
44	17 00	16 31	16 02	15 03	15 04	14 29	13 44	13 09	12 44	12 09
46	17 45	17 17	16 48	16 19	15 50	15 16	14 42	14 07	13 32	12 56
48	18 30	18 02	17 34	17 05	16 36	16 02	15 28	14 44	14 20	13 46
50	19 16	18 50	18 24	18 57	17 20	16 45	16 10	15 35	15 00	14 25
52	20 12	19 44	19 16	18 48	18 20	17 47	17 14	16 41	16 08	15 35
54	21 44	21 20	19 56	19 31	19 06	18 40	18 14	17 47	17 20	16 52
56	23 00	22 30	22 00	21 31	20 58	20 20	19 42	19 04	18 34	18 06
58	23 40	23 12	22 44	22 12	21 48	21 12	20 36	20 00	19 24	18 48
60	24 40	24 09	23 38	23 07	22 36	22 15	21 34	21 02	20 28	19 56

Longitude West.——Variation East.

Lat. North	50	51	52	53	54	55	56	57	58	59
	o ′	o ′	o ′	o ′	o ′	o ′	o ′	o ′	o ′	o ′
0	1 30	2 15	3 00	3 38	4 15	4 58	5 30	5 55	6 20	6 45
2	1 12	1 42	2 12	2 54	3 36	4 18	5 00	5 14	5 28	5 42
4		42	1 24	2 03	2 42	3 21	4 00	4 15	4 30	4 45
6	42		42	1 20	1 58	2 36	3 11	3 27	3 45	4 00
8	1 14	0 44		40	1 14	1 49	2 22	2 40	2 58	3 18
10	1 47	1 10	0 40		31	1 02	1 32	1 51	2 10	2 30
12	2 26	1 50	1 12	0 40			50	1 08	1 30	1 51
14	3 04	2 30	1 56	1 22	0 50			34	0 44	1 12
16	3 38	3 09	2 40	2 11	1 33	1 03	0 30			0 40
18	4 14	3 46	3 19	2 47	2 15	1 43	1 10	0 42		
20	4 41	4 13	3 58	3 28	2 58	2 27	1 56	1 26	0 56	26
22	5 32	5 03	4 34	4 04	3 33	3 02	2 31	2 09	1 47	1 20
24	6 04	5 37	5 10	4 39	4 08	3 47	3 06	2 45	2 24	2 02
26	6 28	6 02	5 35	5 05	4 35	4 05	3 35	3 13	2 50	2 27
28	6 52	6 26	6 00	5 31	5 02	4 38	4 04	3 38	3 12	2 46
30	7 26	7 02	6 38	6 07	5 35	5 02	4 32	4 08	3 44	3 20
32	8 00	7 38	7 16	6 42	6 08	5 34	5 00	4 36	4 12	3 48
34	8 24	7 56	7 45	7 11	6 37	6 03	5 30	5 04	4 38	4 12
36	9 06	8 40	8 14	7 41	7 08	6 34	6 00	5 32	5 04	4 36
38	9 45	9 19	8 53	8 19	7 35	7 01	6 37	6 07	5 37	5 07
40	10 22	9 56	9 30	8 56	8 22	7 44	7 14	6 42	6 10	5 38
42	10 59	10 36	10 13	9 38	9 03	8 28	7 52	7 18	6 44	6 10
44	11 45	11 21	10 56	10 20	9 44	9 07	8 30	7 54	7 18	6 42
46	12 28	12 00	11 33	11 00	11 25	10 50	9 14	8 44	8 16	7 44
48	13 14	12 42	12 10	11 37	11 04	10 31	9 58	9 28	9 10	8 30
50	14 00	13 34	13 08	12 38	12 08	11 38	11 08	10 30	10 00	9 28
52	15 04	14 32	14 00	13 30	13 00	12 30	12 00	11 26	10 54	10 26
54	16 18	15 44	15 10	14 40	14 10	13 40	13 00	12 24	11 54	11 24
56	17 31	16 56	16 20	15 50	15 20	14 50	14 20	13 50	13 20	12 50
58	18 14	17 39	17 04	16 36	16 04	15 34	14 30	14 10	13 40	13 10
60	19 18	18 39	18 00	17 30	17 00	16 46	16 00	15 20	14 50	14 20

Line of No Variation.

Variation West.

Longitude

Longitude West.——Variation East.

Lat. North.	60	61	62	63	64	65	66	67	68	69
	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
0	7 10	7 32	7 54	8 10	8 36	8 57	9 18	9 40	10 00	10 20
2	5 55	6 23	6 55	7 13	7 43	8 04	8 25	8 46	9 08	9 30
4	4 50	5 27	5 54	6 21	6 50	7 09	7 28	7 47	8 06	8 26
6	4 18	4 45	5 12	5 40	6 01	6 22	6 43	7 04	7 25	7 46
8	3 36	4 00	4 24	4 48	5 12	5 32	5 52	6 13	6 34	6 54
10	2 50	3 15	3 40	4 06	4 31	4 50	5 10	5 30	5 49	6 10
12	2 04	2 30	2 56	3 22	3 50	4 07	4 24	4 41	5 00	5 18
14	1 30	1 58	2 26	2 54	3 22	3 38	3 56	4 12	4 25	4 41
16	56	1 23	1 50	2 17	2 45	3 02	3 18	3 34	3 50	4 06
18	20	40	1 12	1 38	2 04	2 22	2 40	3 00	3 21	3 40
20			34	1 00	1 26	1 46	2 06	2 27	2 48	3 10
22	1 04	0 30		26	52	1 12	1 32	1 52	2 12	2 32
24	1 42	1 14	0 42			34	0 56	1 16	1 36	1 56
26	2 04	1 40	1 12	0 40			34	1 00	1 20	1 40
28	2 30	2 02	1 34	1 06	0 38			44	1 04	1 24
30	2 57	2 30	2 03	1 36	1 07	0 36			46	1 06
32	3 24	2 58	2 31	2 04	1 37	1 20	0 50	20		0 40
34	3 46	3 22	2 57	2 30	2 08	1 38	1 08	0 40		
36	4 08	3 34	3 10	2 45	2 29	2 00	1 30	1 00	0 30	
38	4 37	4 15	3 43	3 23	3 10	2 39	2 08	1 37	1 04	0 32
40	5 06	4 45	4 24	4 03	3 41	3 11	2 41	2 09	1 38	1 08
42	5 36	5 15	4 54	4 33	4 12	3 33	3 06	2 39	2 10	1 42
44	6 06	5 45	5 24	5 02	4 43	4 13	3 43	3 13	2 42	2 12
46	7 14	6 44	6 14	5 44	5 14	4 44	4 14	3 44	3 14	2 44
48	8 00	7 30	7 00	6 30	6 00	5 30	5 00	4 30	4 00	3 30
50	8 54	8 24	7 56	7 26	6 56	6 26	5 56	5 26	4 56	4 26
52	9 56	9 34	9 00	8 30	8 00	7 30	7 00	6 30	6 00	5 30
54	10 28	10 00	9 34	9 04	8 34	8 04	7 34	7 04	6 34	6 04
56	12 20	11 00	10 30	10 00	9 30	9 00	8 30	8 00	7 30	7 00
58	12 40	12 00	11 28	10 58	10 28	9 58	9 28	8 58	8 28	7 56
60	13 50	13 00	12 30	12 00	11 28	10 56	10 26	9 52	9 22	8 50

Line of No Variation.

Variation West.

Longitude

Longitude West.——Variation East.

Lat. North.	70	71	72	73	74	75	76	77	78	79
	o ,	o ,	o ,	o ,	o ,	o ,	o ,	o ,	o ,	o ,
0										
2										
4										
6										
8	7 14	7 35	7 56	8 12	8 28	8 44	9 00	9 15	9 30	9 45
10	6 30	6 50	7 11	7 29	7 47	8 05	8 24	8 38	8 52	9 07
12	5 40	6 24	6 26	6 46	7 06	7 27	7 48	8 02	8 16	8 30
14	5 02	5 35	5 46	6 07	6 28	6 48	7 09	7 23	7 37	7 51
16	4 26	4 46	5 06	5 27	5 48	6 09	6 30	6 44	6 58	7 12
18	3 58	4 16	4 35	4 56	5 17	5 38	6 00	6 15	6 30	6 45
20	3 28	3 46	4 04	4 25	4 46	5 08	5 30	5 46	6 02	6 18
22	2 54	3 16	3 38	4 00	4 22	4 44	5 05	5 19	5 38	5 47
24	2 21	2 46	3 12	3 34	3 56	4 18	4 40	4 58	5 16	5 35
26	2 03	2 26	2 50	3 12	3 34	3 57	4 20	4 39	4 58	5 16
28	1 44	2 04	2 26	2 49	3 12	3 36	4 00	4 19	4 36	4 55
30	1 26	1 46	2 06	2 29	2 43	3 16	3 40	3 58	4 16	4 34
32	1 00	1 20	1 43	2 07	2 31	2 55	3 20	3 38	3 56	4 12
34	36	1 00	1 25	1 48	2 12	2 36	3 00	3 19	3 36	3 55
36		40	1 00	1 28	1 50	2 15	2 40	2 59	3 18	3 35
38			40	1 06	1 32	1 58	2 25	2 44	3 02	3 20
40	0 48	0 28		50	1 17	1 44	2 10	2 28	2 46	3 04
42	1 12	0 42	16		53	1 26	2 00	2 20	2 42	2 54
44	1 28	1 00	0 36			1 17	1 48	2 06	2 26	2 40
46	2 11	1 34	1 01	0 30		1 00	1 38	1 50	2 10	2 26
48	2 37	1 54	1 16	0 50	0 20	50	1 26	1 40	2 00	2 14
50	3 42	2 46	2 00	1 10	0 35		1 13	1 30	1 50	2 02
52	4 34	3 38	2 42	1 40	0 56	0 20	1 00	1 20	1 38	1 50
54	5 04	4 04	3 04	2 04	1 10	0 30	40	1 10	1 28	1 38
56	6 00	5 00	3 56	2 50	1 40	0 50		1 00	1 16	1 26
58	6 50	5 45	4 36	3 30	2 20	1 10		45	1 00	1 14
60	7 42	6 34	5 25	4 20	3 10	2 00		30	0 50	1 02

Line of No Variation.

Variation West. Variation East.

Longitude

Longitude West.——Variation East.

Lat. North.	80	81	82	83	84	85	86	87	88	89
	o ′	o ′	o ′	o ′	o ′	o ′	o ′	o ′	o ′	o ′
0										
2										
4										
6										
8	10 00	10 15	10 30	10 45	11 00	11 15	11 30	11 45	12 00	12 15
10	9 22	9 43	10 05	10 27	10 48	11 03	11 18	11 33	11 48	12 02
12	8 44	9 07	9 30	9 57	10 36	10 51	11 06	11 20	11 34	11 49
14	8 05	8 28	8 51	9 14	9 36	9 56	10 16	10 36	10 56	11 16
16	7 26	7 43	8 00	8 18	8 36	8 56	9 18	9 38	9 59	10 22
18	7 00	7 18	7 39	8 00	8 19	8 40	9 00	9 22	9 44	10 06
20	6 36	6 56	7 16	7 36	7 56	8 20	8 40	9 00	9 20	9 40
22	6 00	6 20	6 40	7 00	7 20	7 50	8 04	8 24	8 44	9 06
24	5 54	6 11	6 29	6 45	7 00	7 30	7 40	8 00	8 20	8 40
26	5 34	5 54	6 14	6 34	6 42	7 10	7 28	7 48	8 00	8 20
28	5 14	5 30	5 45	6 04	6 24	6 48	7 04	7 24	7 44	8 02
30	4 54	5 14	5 32	5 50	6 10	6 28	6 48	7 08	7 28	7 48

TABLES

TABLES OF THE VARIATION OF THE MAGNETIC NEEDLE,

Observed at different Times in the Atlantic Ocean, North of the Equator.

Longitude from the Meridian of London.

Observed by Duclos Guyot, in 1763.

Varia. W.	Lat. N.	Long. W.
° ′	° ′	° ′
3 0	18 07	34 15
3 30	13 25	34 09
5 00	4 23	24 00
5 00	2 10	23 35
5 00	22 41	35 27
5 30	26 05	36 09
7 00	28 10	26 35
7 30	26 35	36 09
8 00	9 22	22 41
8 30	13 31	22 10
9 00	15 33	22 26
9 00	0 13	18 16
9 30	13 31	22 10
10 30	13 45	20 20

Observed by Duclos Guyot, in 1763.

Varia. W.	Lat. N.	Long. W.
° ′	° ′	° ′
11 00	30 14	20 02
11 45	31 13	20 35
12 00	32 24	21 24
12 15	31 12	21 17
12 30	31 10	21 56
13 00	26 12	19 40
14 00	33 56	20 31
16 00	47 43	21 02
18 00	37 35	18 03
18 00	41 25	15 17
18 00	48 54	3 28
19 00	42 50	17 14
19 00	48 54	5 45
19 00	49 03	4 59

Bougainville,

By whom observed in 1766.	Varia. W.	Lat. N.	Long. W.
	° ′	° ′	° ′
Bougainville, 1766,	4 50	14 54	25 45
Carteret, October 10,	5 36	6 34	21 11
Bougainville,	5 45	19 16	27 28
	5 50	17 08	26 37
	5 55	13 10	25 03
	6 00	23 54	27 46
Carteret, October 11,	6 40	6 41	21 05
Bougainville,	8 00	3 00	18 07
Carteret, in September,	8 00	15 00	22 30
September 22,	8 20	16 34	23 20
Bougainville,	8 15	1 45	18 05
Wallis, September 24,	8 20	14 53	23 20
Bougainville,	8 45	27 18	29 53
	11 30	33 46	23 55
	12 30	35 46	21 43
Carteret, Sept. 17,	13	24 33	18 52
Bougainville,	13 15	36 07	18 51
Chappe, Jan. 7,	14 13	27 27	14 42
Wallis, Aug. 3,	14 23	28 30	16 30
Carteret, Sept. 4,	16 00	32 34	17 05
Sept. 3,	19 04	38 36	13 10
Chappe, at Cadiz,	19 12	36 31	5 48
Carteret,	20 17	37 27	13 42
Aug. 30,	20 25	42 20	2 47
Wallis,	21 00	50 00	8 16
Carteret,	22 30	48 18	18 00

By whom observed in 1767, 1768, 1769, *and* 1771.	Varia. E.	Lat. N.	Long. W.
	° ′	° ′	° ′
De Fleurieu, April 28, 1769,	0 00	14 45	47 10
Gerard De Brahm,	0 00	35 30	74 30
July 27, 1771,	0 41	34 38	73 27
July 26, 1771,	1 30	33 25	74 55
	1 30	33 30	77 00

By whom observed in 1767, 1768, 1769, *and* 1771.	Varia. E.	Lat. N.	Long. W.
	° ′	° ′	° ′
Gerard De Brahm,	1 35	30 30	82 10
	2 00	28 40	81 10
	2 00	27 40	80 30
De Fleurieu, June 24, 1769,	2 00	32 15	70 22
March 2,	2 23	14 51	57 27
April 19,	2 24	14 22	51 05
Gerard de Brahm, July 25, 1771, - -	2 42	32 40	80 13
	2 50	32 30	76 02
De Fleurieu, June 22, 1769,	3 27	27 47	70 36
May 3,	3 29	14 39	59 37
June 20,	3 54	23 53	69 52
Gerard de Brahm, 1771,	4 00	27 20	80 30
De Fleurieu, May 22, 1769,	5 10	20 00	71 23
Gerard de Brahm, 1771,	5 24	26 50	80 40
	5 59	29 40	81 50
Off Cape Florida,	6 00	25 42	80 31
	6 25	24 25	82 24
Chappe, La Vera Cruz, March 15, 1769,	6 28	19 10	80 43
Gerard de Brahm,	6 47 W.	30 10	82 00
De Fleurieu, April 28, 1769,	0 00	14 45	47 10
Gerard de Brahm, July 28, 1771, - - -	0 00	35 38	72 14
De Fleurieu, April 1769,	0 21	14 44	47 40
April 27,	0 42	14 42	46 25
Chappe, Jan. 23, 1769,	1 15	18 04	41 48
De Fleurieu, April 26, 1769,	1 15	14 45	43 16
April 25,	1 58	14 47	41 02
June 27,	2 00	34 06	67 11
April 18,	2 15	14 48	39 45
Chappe, Feb. 1,	2 31	15 12	54 43
Gerard de Brahm, July 29, 1771, - - -	3 00	37 06	70 26

Gerard

By whom observed in 1767, 1768, 1769, *and* 1771.	Varia. W.	Lat. N.	Long. W.
	° ′	° ′	° ′
Gerard de Brahm, July 30, 1771, - - -	3 00	37 44	69 38
	3 00	37 07	72 30
De Fleurieu, June 29, 1769,	3 37	36 34	63 10
Chappe, Feb. 8,	4 07	14 53	61 55
Feb. 2,	4 20	15 12	56 30
Wallis, April 11, 1768,	4 30	21 28	36 07
Carteret, Feb. 15, 1769,	4 35	6 28	32 10
Wallis, April 8, 1768,	4 48	15 04	34 00
De Fleurieu, June 30, 1769,	4 53	37 27	63 19
Gerard de Brahm, Aug. 1, 1771, - - -	5 00	38 34	67 29
Aug. 4,	5 00	38 48	62 19
Carteret, Feb. 26, 1769,	6 00	23 54	27 39
Feb. 21,	6 12	14 39	25 45
Feb. 19,	6 48	12 06	24 04
Feb. 10,	7 02	2 39	28 28
Nov. 8,	8 25	1 56	19 46
Chappe, January, 13, 1769,	8 27	23 12	27 05
Carteret, November 8,	8 37	3 45	18 54
Cook and Bayly, Oct. 8, 1768,	8 39	7 58	21 43
Gerard de Brahm, Aug. 8, 1771, - - -	8 52	40 43	54 19
Aug. 10,	9 00	41 27	52 35
Aug. 15,	10 00	41 37	46 05
Cook, Oct. 1, 1768,	10 37	14 06	21 40
De Fleurieu, April 3,	10 55	17 33	17 20
Gerard de Brahm, June 1771,	11 00	42 22	43 42
	11 00	42 20	46 00
Chappe, Dec. 1768,	11 20	31 56	13 05
Wallis, April 1768,	11 34	33 55	31 30
De Fleurieu, April 1769,	12 00	14 26	19 30
	12 15	14 40	16 54

By whom observed in 1767, 1768, 1769, *and* 1771.	Varia. W.		Lat. N.		Long. W.	
	°	′	°	′	°	′
Gerard de Brahm, Aug. 18, 1771, - - -	13	00	44	30	37	35
Aug. 19,	13	00	44	30	40	00
De Fleurieu, July 20, 1769,	13	00	38	10	27	59
Chappe, Dec. 31, 1768,	13	00	30	12	12	51
De Fleurieu, July 21, 1769,	13	19	38	20	29	43
Carteret, March 3,	13	26	32	33	23	05
At St. Michel, March 4,	13	43	34	02	22	02
Gerard de Brahm, Aug. 22, 1771, - - -	14	00	45	34	30	14
Aug. 22,	14	00	45	30	29	30
Chappe, Jan. 5, 1769,	14	07	27	46	14	11
De Fleurieu, Aug. 28,	14	23	31	41	17	44
Chappe, Jan. 1,	14	25	29	29	13	43
Wallis, April 23, 1768,	14	30	36	15	28	01
De Fleurieu, Aug. 8, 1769,	14	38	34	45	19	22
Carteret, March 5,	14	53	35	30	21	26
March 6,	14	58	36	46	20	53
De Fleurieu, Aug. 12,	15	00	32	33	16	41
Gerard de Brahm, Aug. 23, 1771, - - -	15	00	46	28	28	55
Carteret, March 6, 1769,	15	06	36	46	19	53
	15	15	36	46	20	03
De Fleurieu, Sept. 1,	15	28	31	07	12	12
Cook, in Sept.	15	30	32	33	13	24
De Fleurieu, July 18,	15	36	39	25	30	54
Sept. 7,	15	36	33	40	11	15
July 12,	15	43	28	33	15	36
Sept. 4,	15	56	32	4	16	13
Chappe, Jan. 8,	15	57	26	26	18	00
Gerard de Brahm, Aug. 24, 1771, - - -	16	00	47	29	26	49
De Fleurieu, Sept. 8, 1769,	16	00	34	21	11	17
Sept. 11,	16	22	35	30	7	32

Cook,

By whom observed in 1767, 1768, 1769, *and* 1771.	Varia. W.	Lat. N.	Long. W.
	° ′	° ′	° ′
Cook, Sept. 1768,	16 30	32 33	16 19
De Fleurieu, July 9, 1769,	16 30	42 17	42 30
Carteret, March 28,	16 46	39 09	38 32
De Fleurieu, March 29,	16 49	37 42	15 30
Oct. 28,	16 58	47 11	18 21
Aug. 3,	17 02	37 14	25 13
Gerard de Brahm, Aug. 26, 1771, - - -	17 06	48 00	28 10
Aug.	17 10	48 49	23 13
De Fleurieu, at Cadiz, in March, 1769, -	17 15	36 31	6 48
Cook, in sight of Teneriffe, Sept. 23, 1768,	17 22		
De Fleurieu, Oct. 17, 1769,	17 38	46 43	6 32
Cook and Bayly, Sept. 20, 1768, Salvages,	17 50	31 11	
Gerard de Brahm, Aug. 28, 1771, - - -	18 00	49 28	16 09
Aug. 29,	18 00	49 22	19 09
De Fleurieu, Sept. 12, 1769,	18 26	35 49	6 00
Gerard de Brahm, Sept. 5, 1771, - - -	18 30	49 14	2 04
	18 30	49 15	6 29
Kerguelon, 1767,	18 30	60 03	2 11
Courtanvaux, June 9, 1767, at Dunkirk, - -	18 33	51 02	
De Fleurieu, Oct. 12, 1769,	18 40	36 34	06 15
Kerguelon, 1767,	18 42	60 44	2 41
Courtanvaux, 1767, off Rotterdam, - -	19 00	51 55	
Kerguelon, 1767,	19 00	59 30	1 10
Cook, July 30, 1769,	19 29	33 04	14 30
Courtanvaux, 1767, at Calais,	19 36	50 57	1 56E.

Chappe

By whom observed in 1767, 1768, 1769, *and* 1771.	Varia. W.	Lat. N.	Long. W.
	° ′	° ′	° ′
Chappe, 1768, at Havre de Grace, - - -	19 42	49 29	0 17E.
Kerguelon, 1767,	19 42	60 44	2 41
	20 00	48 46	7 34
Wallis, May 13, 1768,	20 00	49 58	6 38
De Fleurieu, Jan. 20, 1769,	20 00	41 56	8 48
Feb. 18,	20 22	44 15	7 50
Kerguelon, 1767,	21 00	60 10	0 31
Cook, Sept. 5, 1768,	21 04	42 50	8 16
Wallis, May 10, 1768,	22 30	49 33	7 25
Kerguelon, 1767,	22 30	50 00	9 41
	23 30	60 58	17 11
	31 00	64 30	23 51
	32 00	65 11	26 11

By whom observed in 1773, 1774, *and* 1776.	Varia E.	Lat. N.	Long. W.
	°	° ′	° ′
On board the L'Ecureuil, 1774,	0 15	27 37	61 18
	1 30	27 16	61 29
	2 30	14 27	53 21
	3 00	14 22	57 47
	3 30	20 16	61 46
	4 45	18 54	61 54
	W.		
On board L' Ecureuil, 1774,	0 30	29 9	59 41
	0 50	14 40	47 50
	1 15	30 32	58 08
	1 30	15 11	45 27
	4 00	31 58	55 02
Cook and Bayly, Aug. 31, 1776, - - -	4 42	0 57	26 30
	4 49	0 07	26 30
	4 52	0 51	26 40

Cook

By whom observed in 1773, 1774, *and* 1774.	Varia. W.	Lat. N.	Long. W.
	° ′	° ′	° ′
Cook and Bayly, Aug. 30,	4 56	1 14	25 32
	5 00	1 14	25 32
On board L'Ecureuil,	5 15	34 33	51 56
	5 45	18 52	40 03
Cook and Bayly,	5 54	0 51	26 40
Aug. 1776,	5 56	0 51	26 40
On board L'Ecureuil, 1774,	5 45	18 52	39 03
	6 00	36 15	49 47
Cook, 1776,	6 10	2 05	25 00
	6 12	1 14	25 32
	6 24	2 05	25 00
Cook and Bayly,	6 33	2 05	25 00
	6 41	0 51	26 40
Aug. 29,	6 49	2 17	24 20
On board L'Ecureuil, 1774,	7 30	21 46	29 17
Cook, Aug. 1776,	7 38	2 28	24 06
Bayly, Aug. 19,	7 56	2 40	23 40
Cook and Bayly, Aug. 26,	8 02	3 59	21 56
	8 05	3 45	22 04
Aug. 29,	8 07	2 40	22 40
Cook, Aug. 15,	8 09	11 51	23 35
Aug 26,	8 13	3 37	22 50
	8 15	3 45	22 04
Bayly, Aug. 25,	8 15	4 23	20 32
Cook,	8 20	4 23	20 32
Aug. 26,	8 27	3 45	22 04
Cook and Bayly, Aug. 27,	8 28	3 37	22 50
Aug. 26,	8 30	3 59	24 56
Cook, Aug. 27,	8 30	3 59	21 56
Cook and Bayly, Aug. 27,	8 40	3 37	22 50
Aug. 26,	8 52	3 45	22 04
Aug. 26,	8 58	3 45	22 04
Rosnevet, 1773,	9 00	0 13	18 06
Cook and Bayly, Aug. 25, 1776,	9 00	4 23	20 32

Cook

By whom observed in 1773, 1774, *and* 1776.	Varia. W.	Lat. N.	Long. W.
	° ′	° ′	° ′
Cook and Bayly, Aug. 25, 1776,	9 02	4 23	20 32
Aug. 26.	9 02	3 45	22 04
Cook, Aug. 25,	9 05	4 23	20 32
Aug. 26,	9 10	3 59	21 56
Bayly, Aug. 27,	9 13	3 37	22 50
Aug. 11,	9 15	15 25	23 06
Aug. 25,	9 15	4 23	20 32
Aug. 13,	9 16	12 21	23 24
	9 16	12 22	23 15
Cook, Aug. 18,	9 17	8 55	22 20
	9 25	8 55	22 20
Bayly, Aug. 29,	9 26	12 08	23 30
Cook, Aug. 13,	9 28	13 32	23 15
	9 31	13 32	23 15
Aug. 21,	9 31	6 33	18 32
Phipps, June 29, 1773,	9 34	78 02	8 20E.
Cook, Aug. 4, 1776,	9 35	12 21	23 20
Cook and Bayly, Aug 14,	9 39	8 55	23 20
Aug. 18,	9 43	12 22	23 15
Aug. 14,	9 44	6 29	19 35
Aug. 22,	9 48	12 21	23 24
Aug. 14,	9 50	15 25	23 06
Aug. 11,	9 51	6 09	18 40
Aug. 22,	9 52	15 25	23 06
Aug. 21,	9 52	8 55	23 20
Aug. 14,	9 52	12 22	23 15
Aug. 21,	9 53	8 55	23 20
Aug. 11,	9 54	15 25	23 06
Aug. 21,	9 55	8 55	23 20
Aug. 18,	9 56	8 55	23 20
On board L' Ecureuil, in 1774, - - - -	10 00	24 25	31 32
Phipps, June 29, 1773,	10 10	78 02	9 20

Cook

By whom observed in 1773, 1774, *and* 1776.	Varia. W.	Lat. N.	Long. W.
	° ′	° ′	° ′
Cook and Bayly, Aug. 11, 1776, - -	10 11	15 25	23 06
Aug. 10,	10 12	19 35	20 09
Cook, Aug. 22,	10 19	6 09	18 40
Aug. 21,	10 19	6 33	18 32
Roſnevet, in 1773,	10 25	5 27	17 06
Cook, Aug. 10, 1776,	10 33	16 37	22 20
Aug 11,	10 38	15 25	23 06
Aug. 10,	10 47	16 37	22 20
Roſnevet, 1773,	11 00	4 30	16 29
	11 00	10 13	20 18
On board the l' Ecureuil, 1774, - -	11 00	25 48	29 32
Cook and Bayly, Aug. 11, 1776, - - -	11 01	15 42	22 52
Cook, Aug. 22,	11 13	6 26	19 35
Roſnevet, in 1773,	11 15	3 45	16 30
Cook and Bayly, Aug. 21, 1776,	11 24	8 55	22 20
	11 37	16 37	22 20
Bayly, Aug. 25,	11 40	17 48	23 36
Aug. 22,	11 42	6 29	19 35
Phipps, June 28, 1773,	11 56	80 30	15 45E.
Cook, Aug. 22, 1776,	11 57	6 29	19 35
	12 12	6 29	19 35
Phipps, June 29, 1773,	12 16	78 02	8 17E.
July 31,	12 24	79 44	10 21
Cook and Bayly, Aug. 18, 1776, - - -	12 24	8 55	22 20
Aug. 11,	12 25	15 42	22 52
On board l' Ecureuil in 1774,	12 30	27 30	27 27
Cook and Bayly, Aug. 22, 1776, - - -	12 38	6 29	19 35
Phipps, June 29, 1773,	12 36	78 02	8 17

By whom observed in 1773, 1774, *and* 1776.	Varia. W.		Lat. N.		Long. W.	
	°	′	°	′	°	′
Cook, Aug. 11, 1776,	12	39	15	42	22	52
Phipps, July 26, 1773,	12	47	80	18	12	42E.
Cook, Aug. 8, 1776,	13	11	19	45	30	09
	13	14	19	46	19	23
On board l' Ecureuil in 1774,	13	15	39	18	38	36
Bayly, Sept. 16, 1776,	13	19	0	22	13	50
Cook, Aug. 8,	13	20	19	42	20	09
Bayly,	13	21	4	17	13	20
On board l' Ecureuil in 1774,	13	30	28	50	25	10
Cook, Aug. 8, 1776,	13	36	19	35	20	09
Cook and Bayly,	13	52	20	30	19	33
Aug. 3,	14	00	28	30	16	40
On board l' Ecureuil in 1774,	14	00	30	37	22	54
Wallis, Sept. 8, 1776,	14	10	32	35	16	10
Cook, Aug. 8,	14	19	20	30	19	33
	14	30	20	30	19	33
	14	35	20	30	19	33
Aug. 3,	14	41	28	30	16	30
Phipps, July 2, 1773,	14	55	78	22	9	38E.
On board l' Ecureuil in 1774,	15	00	32	38	20	50
	15	00	35	42	16	03
	15	00	40	27	42	39
Cook and Bayly, Aug. 6, 1776,	15	04	23	54	17	50
Cook,	15	12	23	54	17	50
	15	20	23	54	17	50
On board l' Ecureuil in 1774,	15	30	28	50	25	10
	16	00	39	47	12	44
Phipps, June 6, 1773,	16	22	52	20	0	30
	16	38	52	20	0	30
June 27,	16	50	74	20	10	13E.
Bayly, Aug. 19, 1776,	16	52	27	43	20	30
Phipps, June 6, 1773,	16	55	52	20	0	30E.
On board l' Ecureuil in 1774,	17	00	41	07	12	21
	17	08	41	30	39	54

Bayly,

By whom observed in 1773, 1774, *and* 1776.	Varia. W.		Lat. N.		Long. W.	
	°	′	°	′	°	′
Bayly, Aug. 19, 1776,	17	11	26	26	20	32
Phipps, June 25, 1773,	17	11	73	55	7	45 E.
June 2,	17	15	74	20	10	13
Rosnevet, 1773,	17	15	29	00	15	45
	17	18	25	00	18	28
Phipps, June 27,	17	22	74	20	10	13
On board l' Ecureuil, 1774,	17	30	43	39	33	27
Cook and Bayly, July 30, 1776, - - -	17	43	31	08	15	00
On board l' Ecureuil in 1774,	18	00	44	53	31	27
Cook and Bayly, July 28, 1776, - - -	18	07	33	45	14	20
Cook and Bayly, July 29, 1776, - - -	18	11	32	04	14	20
On board l'Ecureuil in 1774,	18	15	43	46	11	50
Cook, July 30, 1776,	18	17	31	08	15	50
July, 28,	18	33	33	45	14	20
July 29,	18	35	33	45	14	20
	18	38	32	04	14	20
	18	39	32	04	14	20
July 21,	18	44	38	10	26	32
Cook and Bayly, July 28,	18	55	33	45	14	20
Phipps, July 31, in 1773,	18	57	79	44	10	21 E.
July 27,	19	00	74	20	10	13 E.
June 19,	19	11	62	3	0	26 E.
On board l'Ecureuil in 1774,	19	13	45	23	9	58
Cook, July 30, 1776,	19	21	31	08	15	00
Phipps, June 17, 1773,	19	22	60	30	1	34
On board l'Ecureuil in 1774,	19	30	48	29	7	22
Phipps, Aug. 31, 1773,	19	33	68	48	3	54 E.
Cook, July 13, 1776,	19	49	50	08	4	10
On board l'Ecureuil,	20	00	47	07	6	59
Cook, Aug. 6, 1774,	20	14	43	17	9	51

By whom observed in 1773, 1774, *and* 1776.	Varia. W.		Lat. N.		Long. W.	
	°	′	°	′	°	′
Cook, July 13, 1776,	20	18	50	08	4	10
On board l'Ecureuil, in 1774,	20	30	46	21	24	15
Cook, July 13, 1776,	20	36	50	08	4	10
Bayly, Aug. 13,	20	38	33	19	15	32
Phipps, July 2, 1773,	20	38	79	50	10	32E.
Sept. 20,	20	47	52	57	2	00E.
On board l'Ecureuil in 1774,	20	49	48	31	7	00
Bayly, Aug. 6, 1776,	20	59	43	36	9	46
On board l'Ecureuil in 1774,	21	00	48	27	10	22
Phipps, June 27, 1773,	21	11	74	20	10	03E.
Bayly, July 11, 1776,	21	36	48	44	9	40
Aug. 11,	21	42	35	51	12	30
Phipps, June 14, 1773,	21	53	60	20	0	37
Sept. 4,	22	14	65	04	2	51E.
Cook, July 25, 1776,	22	27	40	44	10	40
Cook and Bayly, July 17, 1776, - - -	22	38	48	44	4	30
Cook, July 25,	22	56	40	41	10	40
Aug. 8,	22	56	40	41	10	40
Phipps, June 14, 1773,	22	58	60	20	0	09
June 27,	23	08	74	20	10	13E.
June 21,	23	18	68	12	0	07
Cook, July 17, 1776,	23	25	40	41	10	40
Phipps, June 15, 1773,	24	02	60	20	0	11E.
Aug. 31,	24	17	68	47	3	54E.
Bayly, July 17, 1776,	24	50	48	35	4	47
	25	18	48	35	4	47
Phipps, Sept. 5, 1773,	25	46	63	45	2	46E.
June 15,	26	16	60	20	0	09
Sept. 3,	26	55	65	47	2	57E.

Chevalier

By whom observed in 1780, *to* 1782.	Varia. W.	Lat. N.	Long. W.
	° ′	° ′	° ′
Chevalier L'Angle, 1782,	4 45	57 30	71 45
Bayly, June 30, 1780,	6 08	19 44	27 10
July 1,	6 19	21 04	34 50
June 12,	6 21	3 31	25 40
June 27,	7 08	15 11	33 30
June 20,	7 10	9 04	27 00
June 13,	7 18	4 12	25 30
July 8,	7 18	29 24	41 10
July 4,	7 55	25 18	39 44
Cook, June 5,	7 58	5 10	25 10
Aug. 27,	7 58	3 30	22 50
Bayly, June 25,	7 09	12 41	21 16
June 22,	8 05	9 37	28 16
July 6,	8 05	27 48	40 32
Bayly, June 15,	8 15	5 11	25 56
Aug. 25,	8 15	4 23	20 32
Cook and Bayly, June 18,	8 51	7 19	27 20
Bayly, July 10,	9 11	30 28	41 26
Chevalier de L'Angle, Aug. 7, 1782, - -	10 00	59 48	In sight of C. Churchill
Bayly, July 14, 1780,	10 01	35 25	41 06
Cook, July 6,	10 05	27 48	40 30
Bayly, July 12,	10 16	36 15	41 22
Chevalier de L'Angle, Aug. 8, 1782, - -	10 30	59 13	In sight of C. Churchill
Bayly, July 6, 1780,	11 10	36 05	40 30
July 23,	15 07	38 41	32 46
July 21,	15 09	38 10	36 50
July 22,	15 11	38 25	36 51
July 27,	16 43	44 24	33 20
July 29,	17 55	43 33	28 30
July 30,	18 28	43 20	26 50
Aug. 2,	20 23	44 45	12 45

Bayly,

By whom observed in 1780, *to* 1782.	Varia. W.	Lat. N.	Long. W.
	° ′	° ′	° ′
Bayly, Aug. 5,	21 17	45 59	18 50
Aug. 5, 1780,	21 17	45 59	18 50
Cook, Aug. 2,	21 43	44 50	23 00
Aug. 6,	21 45	43 56	9 40
Bayly, Aug. 6,	22 09	48 18	18 00
Aug. 20,	23 10	58 44	4 10
Aug. 18,	24 12	56 08	1 20
Aug. 15,	24 30	55 03	14 40
Aug. 25,	24 31	58 57	3 01
Aug. 17,	24 45	56 06	12 56
Aug. 11,	25 14	52 41	15 40
Aug. 13,	25 26	52 51	15 09
Aug. 12,	25 50	52 48	16 04
Chevalier De L'Angle, September 24, 1782,	33 00	58 00	52 55
——— Aug. 3, 1782,	35 00	61 46	83 13
La Perouſe, Aug. 3,	37 00	61 46	83 13
Chevalier De L'Angle, July 30, - -	41 00	62 41	81 08
Morning, July 14,	41 53	59 41	60 21
Evening, July 14,	42 40	59 41	60 21
Morning, July 12,	42 40	59 42	59 49
Evening, July 12,	42 45	59 42	59 49
July 21,			

By Admiral Gardner on board his Majeſty's ſhip Queen, 1793.	Varia. E.	Lat. N.	Long. W.
	° ′	° ′	° ′
	0 30	13 12	53 03
	0 43	21 40	64 28
	0 50	18 50	63 45
	0 50	24 34	63 51
	1 00	13 08	54 10

By

By Admiral Gardner, on board his Majesty's ship Queen, 1793.	Varia. E.	Lat. N.	Long. W.
	° ′	° ′	° ′
	1 13	26 41	63 30
	1 20	23 30	64 00
	2 00	22 40	64 09
	2 00	25 36	63 39
	W		
	0 20	13 18	51 50
	0 20	27 20	63 25
	0 45	13 29	50 35
	0 50	27 41	63 20
	1 00	13 34	49 26
	1 20	28 49	63 30
	1 30	30 10	62 25
	1 40	14 00	48 18
	2 40	31 18	61 30
	2 58	14 10	47 00
	3 04	32 21	59 51
	5 51	15 24	41 04
	6 04	15 45	39 46
	6 30	33 58	57 00
	9 00	34 10	55 17
	10 00	35 45	54 11
	12 10	37 23	51 20
	12 30	18 10	31 30
	12 56	18 40	30 10
	13 20	29 40	28 55
	13 20	39 03	48 30
	13 40	20 20	28 15
	14 51	21 05	27 00
	15 52	22 27	26 10
	16 19	22 34	25 25
	17 54	24 14	24 55
	18 20	42 48	44 16
	18 36	24 34	24 10

By

By Admiral Gardner, on board his Majesty's ship Queen, 1793.	Varia. W.		Lat. N.		Long. W.	
	°	′	°	′	°	′
	18	39	30	20	20	40
	19	50	26	30	23	40
	20	04	42	56	44	00
	20	05	26	45	23	10
	20	00	28	00	22	40
	20	55	31	19	19	20
	21	20	32	00	19	00
	22	13	43	25	42	12
	23	00	34	30	19	10
	23	14	36	00	18	40
	25	30	44	39	31	00
	28	03	46	31	21	30
	28	50	47	02	19	51
	29	30	47	05	19	30
	27	39	49	46	16	10
	26	00	49	58	12	08

By Admiral Murray, on board his Majesty's ship Duke, 1793.	Varia. E.		Lat. N.		Long. W.	
	°	′	°	′	°	′
	0	00	29	00	63	23
	0	00	29	50	62	41
	0	30	24	36	64	00
	2	30	18	20	63	17
	3	30 W.	Marti		nico.	
	2	30	14	02	48	58
	2	50	30	53	61	29
	9	45	39	09	47	06
	10	00	18	29	32	00
	11	15	36	23	51	16
	13	00	40	26	45	36

By

By Admiral Murray, on board his Majesty's ship Duke, 1793.	Varia. W.		Lat. N.		Long. W.	
	°	′	°	′	°	′
	14	00	22	04	26	00
	15	00	40	56	44	59
	16	30	42	49	40	37
	18	00	44	00	36	25
	19	45	44	30	33	56
	21	15	44	36	28	50
	21	30	46	34	16	02
	23	00	48	49	14	42
	25	30	49	29	11	10

TABLES OF THE VARIATION

OF THE

MAGNETIC NEEDLE,

Observed at different Times in the Atlantic Ocean, South of the Equator,

Longitude from the Meridian of London.

By whom observed in 1760, 1763, 1764, *and* 1765.	Varia. E.		Lat. S.		Long. W.	
	°	′	°	′	°	′
Duclos Guyot, in 1763,	0	00	9	20	28	56
	1	00	9	20	28	56
	1	30	7	29	28	23
	2	00	11	07	30	01
	4	00	16	57	28	58
	5	00	18	44	30	58
	6	00	25	12	33	48
	7	00	28	57	36	35
	10	00	25	56	45	12
	10	12	26	22	47	24
Byron, Nov. 11, 1764,	11	45	42	34	57	47
Duclos, in 1763,	12	00	34	39	40	22
	12	00	32	10	47	56
Byron, Nov. 4, 1764,	13	00	38	53	50	30
Duclos, in 1763,	13	00	33	40	49	23
	13	30	27	39	46	07
	15	00	34	58	51	33
	15	00	37	13	52	32

By whom observed in 1760, 1763, 1764, *and* 1765.	Varia. E.		Lat. S.		Long. W.	
	°	′	°	′	°	′
Duclos in 1763,	16	00	40	34	54	35
	17	00	41	39	53	06
	17	30	38	22	43	44
Byron, Nov. 10, 1764,	18	20	41	16	54	47
Duclos Guyot, in 1763,	19	00	42	28	52	52
	19	00	42	39	48	32
Byron, Jan. 11, 1765,	19	00	51	24	63	40
Nov. 12, 1764,	19	30	43	46	59	35
Nov. 15,	19	41	45	21	62	32
Duclos Guyot, in 1763,	20	00	46	33	52	01
	21	00	47	05	57	04
	22	00	49	47	58	16
Byron, Jan. 12, 1765,	23	30	51	27	63	24
	W.					
Duclos, in 1763,	3	00	11	39	26	40
	4	00	3	30	25	23
	4	30	2	15	25	33
Le Gentil, April 22, 1760,	7	28	4	44	27	41

By whom observed in 1766, 1767, 1768, 1769, *and* 1770.	Varia. E.		Lat. S.		Long. E.	
	°	′	°	′	°	′
Carteret, Oct. 31, 1766,	1	24	12	56	329	44
Nov. 2,	1	40	17	22	328	22
Morning, Nov. 7,	4	56	23	54	332	20
Evening, Nov. 7,	5	56	23	54	332	20
Nov. 8,	6	45	25	49	321	09
Nov. 11,	8	50	29	57	318	03
Cook, Nov. 1769,	11	09	36	48	4	34
Dec. 25,	11	35	35	10	8	50
Carteret, Nov. 15, 1766,	12	00	34	12	313	49
Nov. 16,	12	36	34	38	312	32
Dec. 7, 1769,	12	40	34	44	6	00
Cateret, Nov. 17, 1766,	13	03	34	46	313	02
Cook, Feb. 1770,	13	05	41	00	6	15

By whom observed in 1766, 1767, 1768, 1769, *and* 1770.	Varia. E.	Lat. S.	Long E.
	° ′	° ′	° ′
Cook, March,	14 00	44 47	13 39
Jan. 9,	14 15	38 04	5 12
Carteret, Nov. 17, 1766,	14 20	34 46	312 32
Nov. 18,	14 30	35 37	310 41
Cook, Feb. 13, 1770,	15 04	42 02	6 30
March 6,	15 10	47 06	10 30
Feb. 17,	15 30	45 10	7 00
Carteret, Nov. 20, 1766,	15 33	36 57	308 42
Nov. 18,	15 45	35 37	309 41
Nov. 21,	15 52	37 40	309 25
Cook, March 4, 1770,	16 16	46 31	8 40
March 7,	16 29	47 06	12 30
Feb. 27,	16 34	47 43	9 30
Carteret, Nov. 28, 1766,	19 00	41 14	303 42
Nov. 29,	19 02	42 08	301 49
Dec. 7,	19 40	47 14	296 53
Nov. 29.	19 45	42 08	301 49
Dec. 7,	20 20	47 00	299 39
Dec. 8,	20 30	48 54	296 26
Dec. 6,	20 34	47 35	297 40
Dec. 9,	20 35	49 12	295 59
Dec. 5,	20 40	48 01	299 02
Wallis, Dec. 8,	23 15	47 56	294 06
	W.		
Carteret, Oct. 31,	0 00	12 30	330 00
Bougainville, Jan. 14, 1767,	0 10	10 30	329 20
Carteret, Oct. 30, 1766,	0 30	10 57	330 21
Oct. 28,	1 50	8 46	331 16
Bougainville, Jan. 11, 1767,	3 17	5 00	331 05
Carteret, Oct. 27, 1766,	3 52	7 03	331 41
Oct. 25,	4 30	4 14	333 07
Feb. 6, 1768,	8 32	0 20	342 03
Bougainville, in 1766,	8 45	1 08	342 55
Carteret, Feb. 5, 1768,	8 58	2 01	342 56

Carteret,

By whom observed in 1766, 1767, 1768, 1769, *and* 1770.	Varia. W.		Lat. S.		Long. E	
	°	′	°	′	°	′
Carteret, Feb. 3, 1769,	9	04	5	04	344	45
Feb. 4,	9	10	3	26	343	42
Feb. 2,	9	34	6	45	345	47
Bougainville in 1766,,	9	45	7	22	345	43
Wallis, March 23, 1768,	9	53	7	58	346	26
March 24,	10	00	7	28	346	00
Bougainville, Jan. 11, 1767,	10	00	10	30	329	55
in 1766,	10	25	7	37	347	12
	11	00	8	20	349	00
Carteret, Jan. 27, 1769,	11	40	11	36	351	05
Jan. 25,	11	47	12	54	352	25
Bougainville, in 1766,	11	50	11	11	352	02
	12	00	14	21	354	24
Carteret, Jan. 19, 1769,	12	30	14	22	353	26
Wallis, March 19, 1768,	12	47	15	57	354	41
March 15,	12	50	16	26	358	25
	13	00	16	44	358	30
Carteret, Jan. 19, 1769,	13	46	16	06	358	52
Bougainville, in 1766,	13	50	17	26	7	41
Carteret, Jan. 18, 1769,	14	38	17	05		40
Jan. 14,	16	19	22	16	6	22
Cook, Dec. 9,	16	30	49	46	20	28
Bougainville, 1766,	16	30	25	51	7	08
Carteret, Jan. 15, 1769,	16	31	21	04	4	24
Bougainville, in 1766,	18	15	44	30	305	46
	18	50	28	49	14	17
Carteret, Jan 9, 1769,	19	20	30	37	13	38
in Nov. 1768,	19	30	34	24	19	00
Bougainville, in 1766,	19	45	45	04	304	13
	19	50	28	49	13	17
	19	56	45	33	303	08
	0	25	34	47	20	51
	0	40	32	47	17	22

Cook

By whom observed in 1772, 1773, 1774, *to* 1780.	Varia. E.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook and Bayly, Sept. 11, 1776, - - -	0 00	14 11	347 04
Sept. 9,	0 00	9 35	325 38
Sept. 7,	0 01	7 50	326 10
	0 05	8 43	326 10
Sept. 8,	0 05	9 35	326 10
Sept. 5,	0 06	6 45	327 00
Sept. 10,	0 06	12 40	325 41
Sept. 6,	0 07	7 18	326 23
Sept. 7,	0 08	8 43	326 10
Sept. 8,	0 08	9 35	324 38
Sept. 7,	0 08	8 43	332 10
Sept. 11,	0 12	14 11	325 41
Sept. 7,	0 13	8 43	332 10
	0 15	9 01	325 41
Sept. 10,	0 15	9 01	325 42
Sept. 11,	0 16	13 23	325 41
	0 18	13 23	325 41
Sept. 8,	0 20	9 35	328 38
Sept. 11,	0 22	14 11	325 41
Sept. 9,	0 24	11 01	325 41
Sept. 10,	0 27	12 40	325 41
Sept. 8,	0 29	9 35	325 38
Sept. 11,	0 29	14 11	325 41
Sept. 8,	0 30	9 01	325 42
Sept. 6,	0 32	7 18	326 23
Sept. 10,	0 33	12 40	325 41
Sept. 8,	0 34	9 01	325 40
Nov. 2.	0 34	10 38	328 17
Sept. 5,	0 36	6 45	327 00
Sept. 11,	0 38	13 23	325 41
	0 40	14 11	325 41
Sept. 13,	0 40	16 12	335 10
Sept. 23,	0 40	29 29	331 18

Cook

By whom observed in 1772, *to* 1780.	Varia. E.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook and Bayly, Sept. 10, 1776, - - -	0 44	12 40	325 41
Sept. 8,	0 44	9 01	325 40
Sept. 11,	0 45	13 23	325 41
Sept. 8,	0 45	9 01	325 40
Sept. 11,	0 48	13 23	325 41
Sept. 13,	0 48	16 12	325 10
Sept. 12,	0 50	15 33	325 50
Sept. 6,	0 51	7 18	326 10
Sept. 12,	0 55	15 33	325 50
Sept. 22,	0 56	29 19	329 59
Sept. 12,	0 57	15 33	325 50
Sept. 8,	0 58	9 35	325 38
Sept. 22,	0 58	29 12	329 59
Sept. 10,	0 59	12 40	325 41
	0 59	12 40	325 41
Sept. 5,	1 00	6 45	327 00
Sept. 12,	1 00	15 33	325 50
Sept. 23,	1 00	29 29	331 18
Sept. 22,	1 01	29 12	329 59
Sept. 11,	1 01	13 23	325 41
Sept. 22,	1 02	29 12	329 59
Sept. 9,	1 03	10 04	325 41
Sept. 24,	1 03	30 25	334 02
Sept. 23,	1 05	29 29	331 18
Sept. 5,	1 07	6 45	327 00
Sept. 11,	1 09	14 11	325 41
Sept. 10,	1 12	12 40	325 41
Sept. 5,	1 14	6 45	327 10
Sept. 13,	1 15	16 12	325 10
Cook, Sept. 22,	1 15	29 12	329 59
Cook and Bayly, Sept. 5,	1 16	6 47	327 00
Cook, Sept. 24,	1 17	30 25	335 02
Sept. 14,	1 18	18 30	324 40

Cook

By whom observed in 1772, *to* 1780.	Varia. E.	I at. S	Long. E.
	° ′	° ′	° ′
Cook, Sept. 10,	1 19	12 4[illegible]	325 41
Sept. 12,	1 20	15 33	325 50
Sept. 22,	1 20	29 12	329 59
Sept. 13, 1776,	1 21	16 12	325 10
Cook and Bayly, 27,	1 22	29 12	329 59
Cook, Sept. 23,	1 22	29 29	331 18
Sept. 22,	1 23	29 12	329 59
Furneau, Feb. 22, 1773,	1 26	53 12	347 30
Cook and Bayly, Sept. 14, 1776, - - -	1 30	17 40	324 42
Sept. 23,	1 31	29 29	331 18
Sept. 21,	1 31	28 19	328 10
Sept. 23,	1 33	29 29	331 18
Sept. 14,	1 35	18 30	324 40
Sept. 24,	1 38	18 30	324 40
	1 39	30 25	334 02
Sept. 5,	1 40	6 45	327 10
Sept. 20,	1 40	27 44	327 23
Sept. 12,	1 42	15 33	325 50
Sept. 22,	1 43	28 36	329 50
Sept. 11,	1 43	13 23	325 41
Sept. 13,	1 43	16 12	325 10
Sept. 14,	1 43	18 30	324 40
Sept. 13,	1 44	16 12	325 10
Sept. 16,	1 44	20 46	324 23
	1 47	20 46	324 23
Sept. 13,	1 48	16 12	325 10
Sept. 23,	1 48	29 29	331 18
Sep. 12,	1 50	15 33	325 50
	1 51	15 33	325 50
Sept. 22,	1 53	29 12	329 59
	1 55	28 36	329 30
Sept. 20,	1 56	27 44	327 23
Sept. 21,	1 58	27 44	327 23

Cook

By whom observed in 1772, *to* 1780.	Varia. E.	Lat. S.	Long. E.
	° ′	°	° ′
Cook & Bayly, Sept. 23, 1776,	2 01	29 29	331 18
Sept. 21,	2 01	28 19	327 34
Sept. 13,	2 04	28 19	329 10
Sept. 22,	2 04	28 36	329 30
Sept. 13,	2 04	16 12	325 10
Sept. 17,	2 07	24 17	324 22
Sept. 16,	2 07	21 37	324 21
Sept. 14,	2 09	17 40	324 42
Cook, Sept. 14,	2 11	17 40	324 42
Sept. 21,	2 11	28 19	328 10
Sept. 22,	2 12	28 36	329 30
Sept. 21,	2 13	28 19	328 10
Sept. 20,	2 15	27 44	327 23
Sept. 13,	2 15	16 12	325 10
Sept. 14,	2 16	18 32	324 40
	2 16	18 30	324 40
Sept. 16,	2 20	20 46	324 23
Cook and Bayly, Sept. 22,	2 22	28 36	329 30
Sept. 13,	2 23	16 12	325 10
Sept. 16,	2 23	21 37	324 21
Sept. 17,	2 24	24 17	324 22
Sept. 20,	2 25	27 44	327 23
Sept. 16,	2 26	21 37	324 21
Sept. 21,	2 27	28 19	328 10
Sept. 17,	2 28	24 17	324 22
Cook, Sept. 21,	2 28	28 19	328 10
Sept. 22,	2 31	28 36	329 30
Sept. 24,	2 37	30 25	334 02
Sept. 14,	2 38	17 40	324 42
Sept. 19,	2 39	26 47	326 03
Sept. 17,	2 43	24 17	324 22
Sept. 16,	2 43	20 46	321 28
Sept. 20,	2 44	27 44	328 16
	2 44	27 44	327 23

By whom observed in 1772, *to* 1780.	Varia. E.		Lat. S.		Long. E.	
	°	′	°	′	°	′
Cook, Sept. 16, 1776,	2	44	21	37	324	21
Sept. 13,	2	45	16	13	325	10
Sept. 20,	2	46	27	14	328	16
Nov. 16,	2	49	20	46	324	23
Sept. 19,	2	49	26	47	326	03
Sept. 17,	2	50	24	17	324	22
Sept. 20,	2	50	27	29	326	40
Sept. 16,	2	52	20	46	324	23
Cook and Bayly, Sept. 14,	2	52	18	30	324	40
	2	53	17	40	324	40
Sept. 20,	2	53	27	44	327	23
Sept. 17,	2	55	24	17	324	42
Sept. 14,	2	55	17	42	324	40
Sept. 20,	2	57	27	14	328	16
Sept. 19,	2	59	26	47	326	03
Sept. 20,	3	00	27	14	328	16
Sept. 14,	3	02	18	30	324	40
Sept. 16,	3	06	21	27	324	21
Sept. 22,	3	12	28	36	330	30
Sept. 20,	3	13	27	14	328	16
Sept. 19,	3	14	26	47	326	03
Sept. 16,	3	14	21	37	324	21
	3	15	20	46	324	23
Sept. 22,	3	15	28	36	329	30
Sept. 17,	3	16	24	17	324	22
Cook, Sept. 19,	3	16	26	47	326	03
	3	17	27	14	328	16
	3	19	26	47	326	03
	3	19	25	54	325	30
	3	23	26	47	326	03
Sept. 17,	3	24	24	17	324	22
Sept. 16,	3	24	21	37	324	21
Cook and Bayly, Sept. 20,	3	25	27	14	328	15
	3	26	27	14	328	16

Cook

By whom observed in 1772, *to* 1780.	Varia. E.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook & Bayly, Sept. 22, 1776,	3 27	28 36	329 30
Sept. 15,	3 32	20 08	324 29
Cook, Sept. 19,	3 32	25 54	325 30
Sept. 19,	3 34	20 08	324 29
	3 26	25 54	325 30
Sept 15,	3 27	20 08	324 29
Sept. 19,	4 02	26 47	326 03
Sept. 16,	4 19	20 46	324 23
Feb. 5, 1775,	5 18	57 08	337 56
Sept. 15, 1776,	5 26	20 08	324 29
Feb. 26, 1774,	5 53	36 37	354 37
Furneau, Feb. 15, 1773,	6 30	53 14	358 32
Cook, Feb. 25, 1774,	6 38	37 52	353 52
Feb. 24,	8 10	37 25	352 20
Furneau, Feb. 26, 1773,	9 20	53 29	50
Cook, Jan. 26, 1775,	9 26	53 33	329 20
Feb. 1,	10 11	58 25	333 12
Furneau, Feb. 27, 1773,	11 00	53 29	3 41
Cook, Dec. 14, 1773,	14 12	64 55	297 05
Furneau, March 7, 1773,	16 32	48 30	14 56
March 3,	16 45	53 17	12 23
Cook, Jan. 1, 1775,	19 25	54 35	315 20
Furneau, March 17, 1773,	21 00	34 13	18 35
Cook, Jan. 4, 1775,	21 28	57 09	301 44
	W.		
Cook and Bayly, Sept. 8, 1776, - - -	0 2	9 01	325 30
	0 03	9 35	325 28
Sept. 6,	0 03	7 18	326 23
Sept. 24,	0 04	30 25	334 02
Sept. 5,	0 06	6 00	327 40
Sept. 6,	0 06	7 50	326 10
Sept. 9,	7	7 50	326 10

By whom observed in 1772, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook & Bayly, Sept. 8, 1776,	9	11 01	325 41
	11	9 35	325 28
Sept. 9,	11	11 01	325 41
Sept. 5,	14	6 45	327 00
Sept. 6,	15	8 43	326 10
Cook, Sept 8,	16	9 35	325 28
Sept. 11,	17	14 11	325 41
Sept. 13,	18	10 38	328 17
Sept. 11,	19	14 11	322 46
Sept. 7,	21	8 43	325 41
Cook and Bayly, Sept. 6,	21	7 50	326 10
Sept. 7,	21	7 50	326 10
Sept. 5,	21	6 00	327 40
	22	7 50	326 10
Sept. 8,	23	9 35	325 38
Sept. 24,	23	30 25	334 12
Sept. 9,	26	10 42	325 41
Sept. 8,	26	9 01	325 42
Sept. 6,	26	7 50	326 10
Sept. 11,	28	14 11	325 41
Sept. 24,	28	30 25	334 12
Sept. 14,	30	13 23	325 41
Sept. 9,	31	10 04	325 41
Sept. 7,	32	8 43	326 10
Rosnevet, in 1773,	33	23 00	337 20
Cook, Sept. 9, 1776,	34	8 43	326 10
Sept. 11,	37	13 23	325 41
Sept. 9,	38	10 04	325 41
Sept. 6,	42	7 18	323 23
	42	7 50	326 10
Sept. 24,	43	30 25	334 02
Sept. 5,	44	12 40	325 41
Sept. 10,	44	12 40	325 41
Sept. 11,	44	13 23	325 41

Cook,

By whom observed in 1772, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook, Sept. 9, 1776,	44	10 32	325 41
	46	10 04	325 41
Sept. 5,	46	6 45	327 00
Sept. 9,	50	10 04	325 41
Sept. 6,	52	7 18	326 23
	54	7 18	326 00
Sept. 24,	57	30 25	334 02
Roſnevet, in 1773,	1 00	20 20	336 12
	1 06	24 30	338 37
Furneau, Feb. 10, 1775,	1 07	58 15	349 56
Cook, Sept. 7, 1776,	1 08	8 43	326 10
Sept. 9,	1 08	10 04	325 41
Roſnevet, in 1773,	1 09	19 41	336 08
Cook, Sept. 4, 1776,	1 12	5 34	328 23
Sept. 5,	1 18	6 45	327 00
Sept. 6,	1 20	7 50	326 10
Sept. 12,	1 20	15 33	325 50
Sept. 4,	1 22	5 34	328 23
Sept. 3,	1 24	5 34	328 23
Roſnevet, in 1773,	1 31	21 46	365 53
Bayly, Sept. 9, 1776,	1 33	10 04	325 41
Roſnevet, in 1773,	1 39	25 30	340 04
Bayly, Sept. 24, 1776,	1 42	30 25	333 52
Sept. 4,	1 42	5 17	328 36
Cook, Sept. 13,	1 44	16 12	325 10
Sept. 3,	1 48	4 22	330 01
Sept. 6,	1 52	7 18	326 23
Roſnevet, in 1773,	1 57	26 32	340 41
	2 00	18 10	335 42
Furneau, Feb. 20, 1773,	2 00	53 15	341 23
Cook, Sept. 3, 1776,	2 02	4 22	330 01
	2 03	4 22	330 01
Sept. 4,	2 03	5 00	328 50
Sept. 3,	2 07	3 37	330 16

Cook,

By whom observed in 1772, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook, Sept. 4, 1776,	2 11	5 00	328 50
Sept. 14,	2 11	17 40	324 42
Sept. 3,	2 14	3 37	330 16
Bayly, Oct. 4, 1776,	2 16	22 17	336 05
Cook, Sept. 14,	2 16	18 20	324 40
Sept. 2,	2 20	2 48	330 53
Oct. 25,	2 24	Equator.	331 00
Sept. 3,	2 27	4 22	330 01
Bayly, Oct. 9,	2 29	3 37	330 16
Sept. 4,	2 30	28 58	339 23
Sept. 3,	2 31	5 00	328 50
	2 36	4 22	330 01
Sept. 28,	2 40	4 22	330 01
Sept. 2,	2 46	33 43	344 03
	2 49	2 48	330 53
Cook, Sept. 2,	2 50	2 48	330 53
Bayly, Oct. 6,	2 52	2 48	330 53
Rosnevet, in 1773,	2 54	24 58	336 22
Cook, Sept. 3, 1776,	2 55	28 31	344 16
Bayly, Sept. 1,	2 55	3 37	330 16
Cook, Sept. 3,	2 56	1 13	331 32
Rosnevet, in 1773,	2 58	4 22	330 01
Cook, Sept. 1, 1776,	3 01	27 32	342 04
Bayly, Oct. 1,	3 01	1 13	331 52
Oct. 9,	3 01	26 17	325 13
Sept. 1,	3 02	29 05	329 30
Rosnevet, in 1773,	3 04	1 13	331 52
Bayly, Sept. 29, 1776,	3 05	16 10	336 37
	3 05	33 48	344 00
Oct. 11,	3 05	33 56	344 16
Sept. 2,	3 06	28 40	340 29
Sept. 9,	3 09	1 50	330 20
Sept. 1,	3 09	3 37	330 16
	3 12	1 13	332 02

Cook,

By whom observed in 1772, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook, Sept. 2, 1776,	3 12	2 48	330 53
	3 14	1 50	330 20
Sept. 3,	3 15	3 37	330 16
Sept. 28,	3 20	33 43	344 03
Roſnevet, in 1773,	3 23	30 50	348 02
Cook, Feb. 12, 1775,	3 23	58 19	353 47
Sept. 2, 1776,	3 23	1 50	330 20
Sept. 3,	3 23	3 37	330 16
Bayly, Sept. 29,	3 25	17 20	335 30
Sept. 28,	3 26	33 43	344 03
Cook, Sept. 2,	3 26	1 50	330 20
Sept. 1,	3 26	1 13	331 32
Bayly, Sept. 2,	3 27	1 50	330 20
Sept. 30,	3 30	20 00	335 10
Roſnevet, in 1773,	3 33	14 07	337 12
Bayly, Sept. 30, 1776,	3 34	18 33	335 28
Sept. 1,	3 36	1 13	331 52
Sept. 2,	3 36	1 50	330 20
Sept. 1,	3 39	1 13	331 52
Roſnevet, in 1773,	3 39	29 21	345 22
Bayly, Sept. 29, 1776,	3 40	33 48	343 00
Sept. 2,	3 43	1 50	330 20
Sept. 1,	3 45	1 13	331 52
Sept. 2,	3 41	1 50	330 20
Sept. 3,	3 48	3 37	330 16
Cook, Sept. 28,	3 54	33 43	344 03
Sept. 3,	4 03	4 22	330 01
Roſnevet, in 1773,	4 05	32 26	354 17
	4 08	12 15	337 40
Cook, Sept. 1, 1776,	4 22	1 13	331 32
Sept. 29,	4 24	33 48	344 00
	4 24	33 56	344 16
Sept. 2,	4 26	2 48	330 53
Sept. 28,	4 26	33 43	344 03

Cook,

By whom observed in 1772, *to* 1780.	Varia. W.		Lat. S.		Long. E.	
	°	′	°	′	°	′
Cook, Sept. 28, 1776,	4	42	33	43	344	03
	4	43	33	43	344	03
Sept. 29,	4	44	33	56	344	16
	4	44	33	56	344	16
Bayly, Oct. 13,	4	45	30	26	344	20
Cook, Sept. 29,	4	45	32	52	344	08
Rosnevet, in 1773,	4	53	31	39	350	48
Bayly, Sept. 5, 1776,	5	06	13	34	336	36
Sept. 29,	5	07	33	48	344	00
	5	07	33	56	344	16
Oct. 3,	5	20	35	27	351	00
Sept. 29,	5	34	33	48	344	00
	5	39	33	56	344	16
Oct. 3,	5	42	35	37	351	00
	5	44	35	37	351	00
Oct. 4,	5	46	35	45	351	10
Sept. 29,	5	47	33	48	344	00
	5	47	33	56	344	16
Oct. 3,	5	51	35	37	351	00
	5	53	34	43	350	50
Oct. 1,	6	00	34	12	349	00
Oct. 16,	6	02	31	42	350	16
Sept. 25,	6	05	11	04	337	40
Oct. 1,	6	13	34	16	348	14
Rosnevet, in 1773,	6	20	9	52	338	13
Bayly, Oct. 16, 1776,	6	20	31	47	349	40
Oct. 3,	6	27	35	37	351	00
Oct. 13,	6	27	34	12	349	00
Oct. 3,	6	28	35	37	351	00
Cook, Oct. 3,	6	29	35	41	351	05
Oct. 4,	6	29	35	45	351	10
Furneau, Jan. 16, 1773,	6	32	54	04	336	16
Cook, Oct. 3, 1776,	6	32	34	43	350	50
Oct. 4,	6	34	35	45	351	10

Cook

By whom observed in 1772, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook and Bayly, Oct. 1, 1776,	6 36	34 12	349 00
	6 37	34 12	349 00
Oct. 3,	6 38	35 37	351 00
Oct. 4,	6 40	35 45	351 10
Oct. 3,	6 46	35 37	351 00
Oct. 4,	6 49	35 45	351 10
Oct. 1,	6 49	34 16	348 14
	7 00	34 16	348 14
	7 02	34 16	348 14
Oct. 4,	7 05	35 45	351 10
Oct. 1,	7 10	34 12	349 00
Oct. 8,	7 09	35 32	353 05
Oct. 3,	7 11	34 43	350 50
Oct. 4,	7 12	35 49	351 16
	7 16	35 49	351 16
Bayly, Jan. 9, 1780,	7 17	1 30	334 30
Oct. 4, 1776,	7 19	35 49	351 16
Oct. 1,	7 21	34 16	348 14
	7 21	34 16	348 14
Oct. 4,	7 23	35 45	351 10
Oct. 7,	7 24	35 19	352 30
Cook, Oct. 4,	7 34	35 49	351 16
	7 35	35 49	351 16
Oct. 7,	7 38	34 12	349 00
Oct. 4,	7 40	35 49	351 16
Cook and Bayly, Oct. 1,	7 41	34 16	348 14
Bayly, Sept. 23, 1780,	7 43	7 05	340 07
Oct. 1, 1776,	7 45	34 12	349 00
Oct. 4,	7 49	35 49	351 16
Oct. 1,	7 50	34 12	349 00
Oct. 4,	7 55	34 49	351 16
Oct. 1,	7 57	34 12	349 00
Rosnevet, in 1773,	8 00	5 17	339 35
Bayly, Oct. 8, 1776,	8 16	35 32	353 05

By whom observed in 1772, *to* 1780,	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Rosnevet, in 1773,	8 20	01 10	341 27
Cook, Oct. 7, 1776,	8 20	35 19	352 30
Bayly, June 7, 1780,	8 32	5 12	336 42
Cook and Bayly, May 28,	8 32	12 00	344 38
Cook and Bayly, Oct. 7, 1776,	8 33	35 19	352 30
	8 34	35 30	352 35
	8 35	35 19	352 30
	8 42	35 19	352 30
	8 43	35 30	352 35
	8 47	35 19	352 30
Oct. 8,	8 49	35 32	353 05
Oct. 3,	9 00	35 32	353 05
Bougainville, in 1776,	9 00	33 51	344 05
Cook, Oct. 7,	9 00	35 31	352 50
	9 01	35 32	353 05
	9 01	35 30	353 05
Bayly, June 4, 1780,	9 08	39 00	340 01
Cook and Bayly, Oct. 7, 1776,	9 14	35 30	352 35
	9 18	35 30	352 35
	9 19	35 30	352 35
	9 19	35 19	352 30
Oct. 8,	9 23	35 32	353 05
Oct. 7,	9 23	35 32	352 35
Oct. 8,	9 27	35 32	353 05
Cook, Oct. 9,	9 41	35 32	353 05
Rosnevet, in 1773,	9 52	31 54	357 56
Cook, May 31, 1780,	9 56	12 00	344 38
Bayly, Sept. 12, 1776,	9 58	3 57	342 02
Cook and Bayly, Oct. 7,	10 00	35 30	352 35
Oct. 9,	10 02	35 25	357 06
Rosnevet, in 1773,	10 10	33 26	00 59
	10 10	34 05	5 01

Cook

By whom observed in 1772, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook and Bayly, May 30, 1780, - - -	10 13	12 00	344 38
	10 15	12 00	344 38
Oct. 9, 1776,	10 18	35 26	357 06
Furneau, Feb. 12, 1773,	10 30	55 46	323 50
Cook and Bayly, Oct. 7, 1776, - - -	10 31	35 19	352 30
Bayly, May 30, 1780,	10 33	13 34	345 10
Cook, Oct. 9, 1776,	10 25	25 26	357 06
	10 40	25 26	357 06
Bayly, May 31, 1780,	10 40	12 04	344 12
	10 43	12 00	344 38
Oct. 9, 1776,	10 45	35 26	357 06
June 2, 1780,	10 50	10 45	342 42
Oct. 9, 1776,	10 50	25 26	357 06
May 30, 1780,	10 57	12 54	344 50
March 27,	11 03	15 45	347 30
Oct. 9, 1776,	11 05	35 26	357 06
May 28, 1780,	11 08	14 24	346 26
May 27,	11 10	15 05	347 12
May 28,	11 22	14 24	346 26
May 24,	11 41	18 27	351 00
Cook, May 28,	11 52	14 24	346 26
Cook and Bayly, May 28,	11 57	14 24	346 26
	12 00	14 21	346 16
Dec. 2, 1772,	12 08	59 12	40 15
Feb. 16, 1775,	12 15	55 26	6 22
Bayly, May 23, 1780,	12 29	19 46	354 30
Cook, May 28,	12 52	14 24	346 26
Feb. 18, 1775,	13 10	54 25	9 16
Rosnevet, in 1773,	13 11	33 52	7 58
Cook and Bayly, May 19, 1780, - - -	13 49	24 40	06

By whom observed in 1772, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Bayly, Sept. 22, 1776,	13 56	33 46	3 00
May 19, 1780,	14 12	24 40	06
May 21,	14 18	22 26	356 32
Roſnevet, in 1773,	14 28	34 16	14 47
May 21, 1780,	14 30	24 40	06
	14 35	24 40	06
May 19,	14 47	24 40	06
Oct. 24, 1776,	15 08	33 55	4 24
Dec. 5, 1772,	15 15	47 10	18 14
Furneau, Feb. 9, 1774,	15 36	57 20	317 46
Bayly, May, 19, 1780,	15 43	24 37	12
Bougainville, in 1776,	16 30	25 51	7 08
Cook, May 19, 1780,	17 13	24 40	06
Furneau, in 1773,	17 15	41 48	18 35
Bayly, Oct. 28, 1776,	17 16	33 57	11 48
May 17, 1780,	17 16	26 40	5 49
Roſnevet, in 1773,	17 37	34 08	18 02
Bayly, Dec. 4, 1772,	17 51	45 46	18 34
Dec. 6,	18 11	48 41	16 54
Dec. 3,	18 16	44 28	18 45
Nov. 27,	18 30	40 04	17 22
July 21, 1780,	18 33	38 10	323 28
Cook, Oct. 14, 1776,	18 37	28 49	351 59
	18 51	34 57	351 59
	18 55	34 57	351 59
Bayly, July 21, 1780,	18 55	38 10	323 28
Oct. 14, 1776,	19 14	34 59	351 59
Roſnevet, in 1773,	19 15	34 04	19 34
Bayly, July 21, 1780,	19 16	38 10	323 28
	19 17	38 10	323 28
Furneau, Feb. 7, 1774,	19 20	59 16	312 12
Cook, Oct. 14, 1776,	19 28	34 57	9 01
Furneau, Feb. 4, 1774,	19 30	60 20	307 10
Bayly, May 14, 1780,	19 58	30 08	11 12

Roſnevet,

By whom observed in 1772, *to* 1780.	Varia. W.		Lat. S.		Long. E.	
	°	′	°	′	°	′
Roſnevet, May 20, 1773,	20	15	34	16	20	53
Bayly, July 21, 1780,	20	20	30	10	333	28
Roſnevet, in 1773,	20	44	34	20	22	18
Bayly, May 12, 1780,	20	56	32	43	17	00
Nov. 7, 1776,	21	15	34	13	17	20
Aug. 2, 1780,	21	26	44	50	337	00
	21	36	44	50	337	00
Roſnevet, in 1773,	22	00	35	27	18	26
Cook, Aug. 2, 1780,	22	20	44	50	337	00
Dec. 23, 1772,	23	56	55	26	338	57
Furneau, Feb. 3, 1773,	124	30	60	04	302	47

TABLES

TABLES OF THE VARIATION OF THE MAGNETIC NEEDLE,

Observed at different Times in the Indian Ocean, North of the Equator.

Longitude from the Meridian of London.

By whom observed in 1767, *to* 1780.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Jan. 14, 1780,	0 02	19 25	114 20
Nov. 20, 1769,	0 06	21 56	131 34
Carteret, Nov. 14, 1767,	0 06	1 57	122 34
Cook and Bayly, Nov. 19, 1769, - - -	0 24	22 14	131 36
Feb. 1, 1780,	0 25	1 04	106 03
Bayly, Nov. 21, 1779,	0 31	21 19	129 12
Jan. 30, 1780,	0 31	4 43	105 23
Feb. 1,	0 32	1 04	106 03
Cook, Feb. 1,	0 34	1 04	106 03
Bayly, Jan. 30,	0 36	3 37	105 25
Nov. 19, 1779,	0 39	22 24	131 36
Carteret, Nov. 7, 1767,	0 39	5 37	125 53
Cook, Nov. 19, 1779,	0 41	22 14	131 36
Feb. 1, 1780,	0 42	1 04	106 03
	0 46	1 04	106 03
Carteret, Nov. 6, 1767,	0 48	5 34	126 10
Cook, Feb. 1, 1780,	0 49	5 34	126 10

Cook,

By whom observed in 1767, *to* 1780,	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, Nov. 8,	0 50	5 30	125 11
Marion and Crozet, Nov. 29, 1772, - -	1 00	12 44	123 58
Bayly, Nov. 28, 1779,	1 00	20 49	117 06
Nov. 18,	1 00	22 14	131 36
	1 07	22 55	136 10
Jan. 31, 1780,	1 19	3 03	105 45
Carteret, Oct. 27, 1767,	1 20	5 34	126 55
Sept. 30,	1 41	4 25	135 07
Oct. 27,	1 45	6 15	126 55
Sept. 27,	2 00	2 50	136 47
Bougainville, in 1766,	2 06	0 12	137 05
Carteret, Nov. 27, 1767,	2 09	2 13	137 11
Oct. 27,	2 10	6 15	136 50
Cook, Nov. 16, 1779,	2 17	25 03	139 26
Carteret, Oct. 12, 1767,	2 19	4 49	134 12
	2 20	5 12	133 57
Bayly, Nov. 16, 1779,	2 29	24 57	139 13
Oct. 16,	2 24	5 55	133 40
Cook, Nov. 16,	2 42	24 52	139 00
Carteret, Sept. 24,	3 08	0 05	139 11
Oct. 3,	3 09	4 41	133 21
Oct. 9,	3 11	4 03	124 24
Sept. 24,	3 14	4 41	133 21
Oct. 6,	3 33	4 21	133 15
Oct. 8,	3 28 W.	3 53	134 43
Cook and Bayly, Jan. 16, 1780, - - -	0 00	15 01	114 15
Bayly, Jan. 31,	0 03	1 36	105 49
Jan. 30,	0 04	3 21	123 33
Jan. 16,	0 10	5 03	113 41
Jan. 30,	0 11	3 21	105 23
Cook, Nov. 21, 1779,	0 14	21 18	129 16

Cook,

By whom observed in 1767, *to* 1780.	Varia. W.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, Feb. 1, 1780,	0 16	1 04	106 03
Carteret, Nov. 26, 1767,	0 19	0 04	118 45
Bayly, Dec. 1, 1779,	0 21	22 07	114 07
Jan. 19, 1780,	0 28	8 58	107 23
Cook, Jan. 16,	0 28	15 01	114 15
Bayly, Nov. 21, 1779,	0 29	21 18	129 16
Cook, Jan. 30, 1780,	0 29	3 21	105 23
Jan. 16,	0 32	21 18	129 16
Jan. 20,	0 33	21 18	129 16
Jan. 16,	0 34	15 01	114 15
Byron, Nov. 7, 1767,	0 38	3 54	103 50
Cook, Nov. 21, 1779,	0 42	21 18	129 16
Feb. 1, 1780,	0 46	1 04	106 03
Cook and Bayly, Jan. 30, 1780, - -	0 50	3 21	105 33
Cook, Jan. 16,	0 52	15 01	114 15
Jan. 30,	0 53	3 21	129 16
Nov. 21, 1779,	0 59	21 18	129 16
Bayly, Jan. 28, 1780,	1 00	7 11	106 27
Nov. 21, 1779,	1 15	21 18	129 16
Cook, Nov. 19,	2 43	22 14	131 36

TABLES

TABLES OF THE VARIATION OF THE MAGNETIC NEEDLE,

Observed at different Times in the Indian Ocean, South of the Equator.

Longitude from the Meridian of London.

By whom observed in 1766, *to* 1773,	Varia. E.	Lat. S.	Long. E.
	° ′	° ′	° ′
Bougainville, in 1766,	0 22	4 29	127 48
	0 33	2 54	130 39
	0 40	1 52	132 48
Furneau, March 6, 1773,	0 55	43 56	139 12
Bougainville, in 1766,	1 55	0 17	134 53
Cook, Aug. 27, 1770,	2 30	9 56	139 30
Bougainville, in 1766,	3 05	1 16	140 17
Cook, Jan. 18, 1770,	3 06	10 36	138 54
Bayly, Aug. 17, 1769,	4 09	12 38	137 15
Bougainville, in 1766,	4 28	2 10	141 54
Bayly, June 5, 1770,	5 35	19 12	133 00
April 24,	7 54	35 19	130 12
March 7,	7 56	33 22	128 30
May 6,	8 00	33 50	125 30
May 10,	8 00	33 02	128 00
April 18,	8 36	25 34	127 15
April 25,	8 48	34 29	128 34
April 5,	9 00	19 12	133 00

By whom observed in 1766, *to* 1773.	Varia. E.	Lat. S.	Long. E.
	° ′	° ′	° ′
Bayly, May 11,	9 10	32 02	128 00
April 20,	10 42	36 18	130 25
April 30,	11 03	34 00	128 57
April 10,	11 25	38 51	123 13
April 14,	11 30	39 30	124 32
April 13,	12 27	29 23	124 30
April 11,	13 48	38 30	123 30
Jan. 29, 1774,	23 35	70 00	107 57
Feb. 4,	25 42	65 42	100 14
	W.		
Wallis, Nov. 26, 1767,	0 00	4 10	175 44
Carteret, Nov. 27,	0 12	0 04	118 15
Bougainville, in 1766,	0 45	5 48	124 45
Bayly, March 16, 1773,	0 47	44 01	135 44
Carteret, Sept. 30, 1768,	0 51	7 41	102 06
May 29, 1768,	0 56	5 29	110 53
In 1768,	1 00	5 31	117 47
Wallis, Dec. 16, 1767,	1 00	6 41	104 00
Bougainville, in 1766,	1 10	6 08	123 31
Cook, Sept. 13, 1770,	1 10	9 45	126 13
Carteret, in Dec. 1767,	1 16	5 30	118 28
Bougainville, in 1766,	1 17	6 26	114 53
Wallis, Dec. 1, 1767,	1 25	6 08	106 00
Bougainville, in 1766,	1 28	6 25	117 47
Furneau, March 1, 1773,	1 30	44 00	135 45
Bougainville, in 1766,	2 03	8 35	101 04
Carteret, Oct. 2, 1768,	2 06	10 37	97 49
Cook, Sept. 22, 1770,	2 44	11 10	110 12
Bougainville, in 1766,	2 50	14 40	94 40
Cook, March 1771,	3 00	6 49	73 42
Sept. 26, 1770,	3 10	10 47	110 38
Carteret, Oct. 4, 1768,	3 12	12 13	94 26
Oct. 12,	3 30	19 50	77 10
Furneau, March 4, 1773,	3 50	44 50	132 50

Bougainville,

By whom observed in 1766, *to* 1773.	Varia. W.	Lat. S	Long. E.
	° ′	° ′	° ′
Bougainville, in 1766,	3 55	18 34	81 57
Bayly, March 6, 1773,	4 03	19 33	79 10
Bougainville, in 1766,	4 45	19 48	70 43
Bayly, Sept. 8, 1770,	5 00	9 46	122 37
Cook, Oct. 14, 1768,	6 26	21 47	73 17
Furneau, March 3, 1773,	6 35	46 22	130 51
Bougainville, in 1766,	6 43	19 48	70 43
	7 10	19 54	68 50
Bayly, Jan. 17, 1766,	7 41	44 18	128 18
Bougainville,	8 55	19 46	67 02
	9 40	19 45	62 54
Cook, March 12, 1773,	9 49	58 56	132 11
Furneau, March 1,	10 20	49 04	125 30
Cook, in 1771,	10 20	23 00	65 30
In March,	10 20	23 00	115 30
Carteret, Oct. 17, 1768,	11 20	24 23	68 32
Oct. 20,	11 48	24 59	67 05
Bougainville, in 1768,	11 48	20 04	60 03
Carteret, Oct. 18,	11 50	25 08	67 51
Cook, March 11, 1773,	11 57	58 07	130 59
March, 1771,	12 20	24 00	122 30
Carteret, Oct. 25, 1768,	12 39	23 23	64 05
Oct. 19,	12 49	25 08	67 38
Oct. 20,	12 54	24 59	67 05
Oct. 24,	12 54	23 21	65 01
Bougainville, 1766,	13 22	19 52	57 33
Rosnevet, in 1773, and 1774,	13 40	20 25	57 04
Carteret, Oct. 26, 1768,	13 42	23 32	63 12
Rosnevet, in 1773,	15 30	20 21	56 36
Furneau, Feb. 28,	15 47	50 20	122 19
Carteret, Oct. 28, 1768,	16 10	24 52	60 44
Rosnevet, in 1773,	16 20	26 00	62 33
Cook, Dec. 10, 1772,	16 29	51 04	20 53
Jan. 14, 1771,	16 50	46 15	115 21

By whom observed in 1766, *to* 1773.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Bougainville, in 1776,	17 00	23 10	54 53
Roſnevet, in 1773,	17 00	21 35	56 49
Cook, March 1771,	17 00	24 00	122 30
Dec. 11, 1772,	17 09	51 51	21 33
Roſnevet, in 1773,	17 16	28 30	62 50
Carteret, Oct. 30, 1768,	18 18	25 40	57 20
Roſnevet, in 1773,	18 31	17 28	50 31
Bougainville, in 1766,	18 40	24 12	53 55
Roſnevet, in 1773,	18 43	25 09	56 23
	18 45	19 08	52 20
Cook, Jan. 14, 1771,	18 55	46 15	115 20
Roſnevet, in 1773,	19 03	18 48	50 48
	19 05	21 58	50 07
	19 08	22 58	54 07
Cook, Dec. 28, 1772,	19 30	58 44	22 25
Roſnevet, in 1773,	19 20	23 01	52 39
	19 40	20 21	51 38
Carteret, Nov. 1, 1768,	20 12	27 05	53 22
	20 20	27 05	53 22
Cook and Bayly in Table Bay, at the C. of G. H.	20 30		
Roſnevet, in 1773,	20 40	30 44	64 35
Cook, Dec. 17, 1772,	20 50	55 16	23 44
Roſnevet, in 1773,	20 53	24 25	50 32
Carteret, Nov. 3, 1768,	20 58	27 40	51 25
Bayly, Jan. 10, 1771,	20 59	48 17	106 49
Carteret, Nov. 5, 1768,	21 09	27 44	49 31
Bougainville, in 1766,	21 10	35 27	22 50
Carteret, Nov. 4, 1768,	21 15	27 42	50 40
Nov. 3,	21 23	27 40	51 25
Cook, Dec. 19, 1772,	21 26	54 17	25 49
Bougainville, in 1766,	21 30	34 32	25 13
Furneau, Feb. 26, 1773,	21 30	51 22	116 02
Carteret, Nov. 23, 1768,	21 39	34 57	26 16

Bougainville,

By whom observed in 1766, *to* 1773.	Varia. W.		Lat. S.		Long. E.	
	°	′	°	′	°	′
Bougainville, in 1776,	21	40	27	16	47	25
Carteret, Nov. 24, 1768,	21	44	34	52	25	30
Cook, Dec. 21, 1772,	21	47	53	50	29	54
Rosnevet, in 1773,	22	15	27	28	47	34
Carteret, Nov. 21, 1768,	22	18	35	46	27	30
Bougainville, in 1766,	22	20	35	31	27	33
Carteret, Nov. 19, 1768,	22	32	35	17	29	08
Nov. 6,	22	38	28	58	46	53
Nov. 20,	22	46	35	42	27	52
Nov. 22,	22	50	35	04	26	59
Rosnevet, in 1773,	23	00	35	19	25	10
	23	15	34	28	40	02
	23	30	36	04	24	05
	23	30	25	56	49	13
Bougainville, in 1766,	23	41	32	41	32	09
Rosnevet, in 1773,	24	00	36	08	64	56
Cook, in 1771,	24	00	35	30	23	30
Jan. 1, 1773,	24	14	38	14	64	43
Rosnevet, in 1773,	24	22	40	40	69	07
	24	30	40	28	67	31
	24	30	36	25	24	39
Carteret, Dec. 10, 1768,	24	40	29	59	44	25
Nov. 7,	24	55	29	59	44	25
Rosnevet, in 1773,	24	56	26	25	48	11
	25	00	39	24	65	35
Furneau, Feb. 23,	25	02	52	18	104	44
Carteret, Nov. 12, 1768,	25	02	32	39	37	47
Nov. 13,	25	05	33	21	35	57
	25	08	32	02	39	17
Rosnevet, in 1773,	25	30	29	42	43	40
Carteret, Nov. 10, 1768,	25	32	30	37	41	18
	25	39	30	12	40	26
Bougainville, in 1766,	25	45	30	41	38	25
Carteret, Nov. 9, 1768,	25	50	30	19	42	07

Rosnevet,

By whom observed in 1776, *to* 1773.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Roſnevet. in 1773,	25 57	32 08	41 25
Cook, in 1771,	26 00	29 00	43 20
In March,	26 10	29 00	37 30
Roſnevet, in 1773,	26 10	30 31	43 09
	26 15	37 58	42 13
	26 28	28 15	50 05
	26 30	40 25	41 31
	26 30	43 58	41 06
	27 05	34 46	42 48
	27 07	35 00	36 06
Bayly, Jan. 11, 1773,	27 15	63 12	37 59
Roſnevet,	27 18	25 04	37 58
	27 30	43 43	69 39
	27 30	34 06	44 37
	27 40	35 06	39 38
Cook, Jan. 9, 1773,	27 42	61 36	35 33
Cook, in 1771,	28 15	34 00	27 30
Oct. 12,	28 27	46 37	38 20
Jan. 14, 1773,	28 27	63 57	40 08
March, 8,	28 35	59 49	121 37
Roſnevet, in 1773,	29 00	33 54	42 54
Bayly, Feb. 1, 1773,	29 03	48 30	58 37
Feb. 10,	29 04	50 07	65 23
Furneau, Feb. 21, 1773,	29 05	52 20	110 32
Roſnevet,	29 05	46 12	44 34
Bayly, Jan. 17,	29 30	70 10	40 05
Roſnevet,	30 00	49 11	43 30
Bayly, Jan. 22,	30 00	54 28	52 16
Feb. 5,	30 26	49 08	58 48
Furneau, Feb. 20,	30 46	52 22	97 38
Jan. 31,	30 49	50 50	57 18
Roſnevet,	30 53	47 58	67 25
	31 00	49 30	57 59
	31 00	48 06	68 06

Roſnevet

By whom observed in 1776, *to* 1773.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Roſnevet, in 1773,	31 00	47 21	68 06
Cook, Jan. 21, 1773,	31 16	62 48	41 55
Feb. 7,	31 28	48 51	62 18
March 6,	31 30	60 04	118 30
Roſnevet, in 1773,	31 30	48 18	68 00
	31 39	48 29	68 04
	32 00	48 53	62 44
Bayly, Feb. 12, 1773,	32 05	52 48	71 05
Jan. 27,	32 23	56 28	51 17
Feb. 6,	32 24	48 06	59 13
Furneau, Feb. 13, 1773,	32 30	51 05	71 53
Cook, Feb. 13,	33 08	53 54	72 54
Jan. 23,	33 28	60 04	47 15
Jan. 24,	33 52	58 24	49 35
Furneau, Feb. 13, 1773,	34 14	51 40	75 22
Cook, Feb. 14, 1774,	34 18	55 23	75 18
Furneau, Feb. 16, 1773,	35 00	52 12	79 06
Cook, Feb. 15, 1773,	38 19	56 52	79 18
Feb. 18,	38 21	57 57	84 14
March 3,	39 04	60 17	110 29
Feb. 20,	40 11	58 47	92 14
Feb. 22,	40 51	59 35	94 06
Feb. 25,	43 06	60 49	95 45

TABLES

TABLES OF THE VARIATION OF THE MAGNETIC NEEDLE,

Observed at different Times in the Indian Ocean, South of the Equator.

Longitude from the Meridian of London.

By whom observed in 1774, *to* 1780.	Varia. E.	Lat. S.	Long. E.
	° ′	° ′	° ′
Bayly, Feb. 26, 1780,	0 43	9 15	105 24
Feb. 23,	1 03	12 46	104 06
Jan. 18, 1777,	4 08	44 12	132 25
Sept. 23, 1776,	4 09	12 38	137 15
Sept. 27,	4 30	0 52	140 26
	W.		
Bayly, Feb. 2, 1780,	0 05	00 46	106 00
	0 07	1 40	106 02
Feb. 25,	0 18	13 40	101 51
Feb. 1,	0 19	1 00	105 55
Cook, Feb. 16,	0 31	6 36	105 41
Bayly, Feb. 18,	0 35	7 22	105 41
Feb. 26,	0 52	13 46	100 20
Feb. 16,	0 54	6 36	105 41
Cook, Feb. 5,	1 11	3 27	106 55
Feb. 16,	1 14	6 36	105 41
	1 31	6 36	105 41
Bayly, March 2,	1 34	17 53	89 55

By whom observed in 1774, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Bayly, Feb. 28, 1780,	1 51	15 45	98 03
Feb. 16,	1 52	6 36	105 41
March 3,	2 03	18 19	87 53
Cook, Feb. 29,	2 37	15 58	95 30
March 3,	3 11	18 25	84 44
	3 15	18 25	84 44
	3 16	18 25	84 44
	3 22	18 25	84 44
Feb. 29,	3 26	15 58	95 30
Cook and Bayly, Feb. 29,	3 36	15 58	95 30
Bayly, Jan. 18, 1777,	4 07	44 18	132 50
	5 24	44 18	132 50
Cook,	5 36	44 18	132 50
Bayly, March 9, 1780,	5 45	20 36	73 00
Cook, Jan. 18, 1777,	6 20	44 18	132 50
Cook and Bayly, Jan. 17,	6 32	44 14	129 09
Furneau, Jan. 17,	6 51	44 18	128 18
Jan. 18,	7 21	44 18	132 50
March 12, 1780,	7 38	21 10	68 50
Bayly, March 11,	7 52	21 04	69 50
March 12,	8 26	21 10	68 50
Cook, Jan. 17, 1777,	8 41	44 18	128 18
March 12, 1779,	8 57	21 10	68 50
March 12, 1780,	9 05	21 10	68 50
	9 19	21 10	68 50
Jan. 17, 1777,	9 23	44 18	128 18
March 12, 1780,	9 26	21 10	68 50
Jan. 17, 1777,	9 26	44 18	128 18
March 12, 1780,	9 49	21 00	68 50
March 17, 1777,	10 02	44 18	128 18
Bayly, March 13, 1780,	10 11	21 31	68 20
March 15,	12 45	23 09	61 50
Cook, March 17, 1780,	14 43	25 00	59 15
Jan. 14, 1777,	14 48	46 15	115 20

By whom observed in 1774, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Cook, Jan. 14, 1777,	15 51	46 15	115 20
	15 54	46 15	115 20
Bayly, Jan. 13, 1777,	17 21	47 25	113 35
March 19, 1780,	17 35	26 29	55 18
Jan. 13, 1777,	17 40	25 09	59 10
March 18, 1780,	18 08	25 09	59 10
Jan. 13, 1777,	18 16	47 29	110 50
March 18, 1780,	18 17	25 09	59 10
Cook, Jan. 13, 1777,	18 18	47 29	110 50
Oct. 31,	18 24	26 31	55 19
Jan. 13,	18 30	47 29	110 50
	18 46	47 29	110 50
March 18, 1780,	18 59	25 09	59 10
	19 04	25 09	59 10
	19 29	25 09	59 10
	19 36	25 09	59 10
March 11, 1775,	20 48	40 56	25 17
Bayly, March 21, 1780,	21 28	27 51	51 20
Cook, March 10, 1775,	21 33	42 06	25 10
Dec. 5, 1776,	21 42	38 52	23 50
	22 12	38 52	23 50
March 3, 1775,	22 26	45 08	31 20
Dec. 12, 1776,	22 30	46 37	38 20
Bayly, Dec. 5,	23 14	39 10	24 19
Cook, Jan. 10, 1777,	23 26	48 26	107 30
Dec. 5, 1776,	23 32	38 52	23 50
Dec. 10,	23 35	44 08	33 10
March 1, 1775,	23 36	46 44	32 50
Dec. 5, 1776,	23 36	38 52	23 50
Jan. 10, 1777,	23 38	48 26	107 30
Dec. 10, 1776,	23 56	44 08	33 10
Bayly, April 5, 1780,	23 58	35 56	22 16
Cook, Jan. 9, 1777,	24 07	48 13	103 43
Dec. 5, 1776,	24 09	38 52	23 50

Bayly,

By whom observed in 1774, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Bayly, April 3, 1780,	24 21	35 19	24 41
Dec. 10, 1776,	24 30	44 08	33 10
Cook, Dec. 10,	24 44	44 08	33 10
	24 46	44 08	33 10
Bayly, April 2, 1780,	24 50	33 41	28 56
March 20,	24 53	31 18	32 49
Dec. 10, 1776,	24 54	44 08	33 10
Jan. 8, 1777,	25 10	47 18	100 46
March 24, 1780,	25 17	29 40	44 00
Dec. 12, 1776,	25 24	46 37	38 20
Dec. 10,	25 29	47 18	100 46
Cook, Jan. 8, 1777,	25 30	47 18	100 46
Cook & Bayly, Dec. 10, 1776,	25 30	44 08	33 10
Cook, March 30, 1780,	25 34	31 12	32 30
Bayly, March 24,	25 35	29 33	41 24
Cook,	25 35	29 40	44 00
Bayly,	25 39	30 12	43 21
Cook and Bayly, March 30,	25 40	31 12	32 30
Dec. 12, 1776,	25 43	46 37	38 20
Bayly, April 1, 1780,	25 44	33 18	29 24
Jan. 8, 1777,	25 45	47 18	100 46
Cook & Bayly, Dec. 10, 1776,	25 56	44 08	33 10
Cook, Dec. 12,	26 00	46 37	38 20
Bayly, March 23, 1780,	26 02	29 03	44 16
Cook and Bayly, Dec. 5, 1776,	26 02	38 52	23 40
Jan. 1, 1777,	26 09	48 30	79 39
Dec. 12, 1776,	26 09	46 37	38 20
Cook and Bayly, Dec. 12,	26 12	46 37	38 20
March 30, 1780,	26 14	31 12	32 30
Cook,	26 15	31 12	32 30
March 28,	26 16	29 40	44 00
Dec. 12, 1776,	26 18	46 37	38 20
Bayly, March 28, 1780,	26 18	31 34	34 50
March 26,	26 28	30 56	37 50

By whom observed in 1774, *to* 1780.	Varia. W.	Lat. S.	Long. E.
	° ′	° ′	° ′
Bayly, March 24, 1780,	26 34	29 40	44 00
Dec. 10, 1776,	26 35	44 23	30 52
March 30, 1780,	27 08	31 12	32 30
	27 12	31 12	32 30
Oct. 27, 1776,	27 15	48 41	69 40
March 30, 1780,	27 16	31 12	32 30
Cook, Oct. 12, 1776,	27 19	46 37	38 20
March 24, 1780,	27 21	29 40	44 00
Oct. 27, 1776,	27 38	29 40	44 00
	27 39	48 41	69 40
	27 40	48 41	69 40
Dec. 27, 1776,	27 43	48 41	69 40
Feb. 2,	27 50	48 36	60 05
Bayly, Jan. 4, 1777,	28 02	48 30	84 50
Cook & Bayly, Oct. 28, 1776,	28 04	48 41	69 40
	28 05	48 41	69 40
Jan. 1, 1777,	28 29	48 31	79 39
Feb. 4,	28 50	49 16	59 24
Bayly, Jan. 1,	28 52	48 20	80 30
Dec. 14, 1776,	29 11	48 00	45 14
Jan. 1, 1777,	29 26	48 31	79 39
Dec. 27, 1776,	29 32	48 41	69 23
Jan. 3, 1777,	29 37	48 16	86 00
Oct. 31, 1776,	29 45	48 41	77 29
Jan 3, 1777,	29 59	48 16	86 00
	30 08	48 16	86 00
Oct. 14, 1776,	30 23	47 56	44 57
March 24, 1780,	30 28	29 40	44 00
Oct. 27, 1776,	30 28	48 41	69 23
Jan. 3, 1777,	30 33	48 16	86 00
Dec. 27, 1776,	30 34	48 41	69 23
Oct. 14, 1777,	30 36	47 56	44 57
Dec. 31, 1776,	30 39	48 41	77 29
Cook and Bayly, Oct. 27,	30 43	48 41	69 23

Cook

By whom observed in 1774, *to* 1780.	Varia. W.		Lat. S.		Long. E.	
	°	′	°	′	°	′
Cook and Bayly, Oct. 14, 1776, - -	30	45	47	56	44	59
	30	48	47	56	44	57
Jan. 1, 1777,	30	53	48	31	79	39
Furneau, Oct. 14, 1776,	30	59	47	56	44	57
Cook, Dec. 14,	31	07	47	56	44	57
March 24, 1780,	31	24	29	40	44	00
Dec. 14, 1776,	31	31	47	56	44	57
Dec. 31,	31	33	48	41	77	29
Dec. 14,	31	40	47	56	44	57
Jan. 3, 1777,	31	44	48	16	86	00
Bayly, Dec. 24, 1776,	31	51	48	37	69	22
Dec. 31,	32	17	48	16	86	00
Dec. 14,	32	18	47	56	44	57

TABLES

TABLES OF THE VARIATION OF THE MAGNETIC NEEDLE,

Observed at different Times in the Pacific Ocean, North of the Equator.

Longitude from the Meridian of London.

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	°	° ′
Bayly, Oct. 25, 1779,	0 23	40 02	143 30
Cook, Nov. 19,	0 41	24 14	131 36
Bayly, Oct. 31,	0 48	34 24	142 30
Cook, Nov. 19,	1 07	35 24	142 30
Bayly, Oct. 25,	1 08	40 09	144 24
Oct. 26,	1 21	39 28	143 18
Oct. 31,	1 21	35 24	142 30
Oct. 27,	1 23	38 17	143 29
Oct. 31,	1 29	35 24	142 30
Oct. 22,	1 30	40 29	148 39
Cook, Oct. 31,	1 31	35 24	142 30
Bayly,	1 36	35 24	142 30
Cook, Oct. 22,	1 38	40 29	148 30
Bayly, Oct. 29,	1 42	37 42	141 55
Cook, Oct. 26,	1 48	39 28	143 18
Oct. 31,	2 03	35 34	142 30
Oct. 22,	2 11	40 29	148 39
Oct. 16,	2 15	39 28	140 18

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Oct. 22, 1779,	2 16	40 29	148 39
Oct. 31,	2 17	35 34	142 30
Cook and Bayly, Oct. 30,	2 18	36 32	142 20
	2 23	36 32	142 20
Cook, Nov. 13,	2 26	24 42	143 37
Bayly, Oct. 31,	2 28	35 40	142 34
Nov. 13,	2 29	24 42	143 37
Oct. 30,	2 29	36 32	142 20
Nov. 16,	2 29	24 57	139 13
Nov. 13,	2 31	24 42	143 37
Oct. 22,	2 34	40 29	148 39
Bayly, Nov. 15,	2 35	25 06	141 36
Nov. 13,	2 36	24 42	143 36
Cook, Nov. 13,	2 51	24 42	143 37
Bayly, Nov 5,	2 55	35 03	144 20
Cook, Oct. 21,	3 04	41 11	149 20
	3 06	41 11	149 20
Nov. 13,	3 09	24 42	143 37
Cook, Nov. 13,	3 12	24 42	143 47
Bayly, Nov. 14,	3 14	24 34	142 32
Nov. 12,	3 16	26 17	148 41
Nov. 4,	3 18	35 42	147 26
Cook, Oct. 21,	3 21	41 11	149 30
Nov. 5,	3 23	35 03	144 20
Bayly, Nov. 13,	3 25	24 43	143 00
Nov. 5,	3 29	35 03	144 20
Oct. 22,	3 35	40 29	148 39
Nov. 5,	3 35	35 03	144 20
Nov. 13,	3 36	24 42	143 37
Nov. 5,	3 38	35 03	144 20
Cook, Nov. 5,	3 40	26 17	144 41
	3 40	35 03	144 20
Nov. 12,	3 44	26 17	144 40
Bayly, Nov. 5,	3 48	35 03	147 34

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Nov. 14,	3 49	24 51	142 08
Oct. 17,	3 53	44 29	153 50
Oct. 21,	4 00	42 20	150 11
Oct. 13,	4 10	49 37	157 17
Oct. 21,	4 12	41 11	149 20
Nov. 12,	4 12	26 17	144 41
Nov. 5,	4 13	35 03	144 20
April 30,	4 14	52 58	159 20
Oct. 22,	4 15	40 29	148 39
Oct. 17,	4 18	44 29	153 50
Oct. 15,	4 20	46 16	156 00
	4 21	45 29	158 15
Oct. 14,	4 30	47 57	155 55
Nov. 5,	4 32	35 03	144 20
Oct. 15,	4 36	46 16	156 00
Oct. 17,	4 37	44 29	153 50
Nov. 13,	4 39	25 35	143 37
Cook, Oct. 15,	4 40	46 16	156 00
Oct. 14,	4 42	46 44	156 00
Bayly,	4 42	46 44	156 00
Dec. 23, 1777,	4 42	1 01	202 55
June 18, 1779,	4 43	52 43	159 29
Oct. 15,	4 44	46 16	156 00
Oct. 17,	4 50	44 30	156 04
	4 51	44 29	153 50
Cook,	4 55	44 29	153 50
Bayly, Dec. 27, 1777,	4 58	1 58	202 59
Oct. 15, 1779,	5 00	46 16	156 00
Cook and Bayly, Oct. 15, 1779, - - -	5 00	45 29	158 15
Oct. 17,	5 00	45 02	156 08
Oct. 15,	5 01	45 29	158 15
Oct. 12,	5 06	50 03	157 32
Oct. 17,	5 07	44 29	153 50

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Oct. 15,	5 07	45 15	155 07
Aug. 21,	5 08	53 14	162 20
Jan. 10, 1778,	5 10	9 42	205 10
Oct. 12, 1779,	5 10	50 50	157 50
Oct. 17,	5 10	44 29	153 50
June 18,	5 11	52 43	159 29
Oct. 17,	5 12	44 29	153 50
Oct. 15,	5 15	45 29	156 06
Wallis, Oct. 17, 1767,	5 15	16 10	144 05
Cook and Bayly, Dec. 27, 1777, - - -	5 17	1 58	202 59
April 17, 1779,	5 17	43 43	160 34
Bayly, Oct. 12,	5 17	50 52	157 40
Dec. 24, 1777,	5 18	1 57	202 55
Dec. 25,	5 18	1 57	202 55
Oct. 12, 1779,	5 20	50 03	157 32
Dec. 26, 1777,	5 22	1 57	203 00
Oct. 12, 1779,	5 22	50 57	157 50
Jan. 5, 1778,	5 24	5 35	203 30
Cook, Oct. 15, 1779,	5 24	5 29	155 10
Oct. 12,	5 25	50 55	157 30
Bayly, Jan. 10, 1778,	5 25	9 42	205 10
Jan. 8,	5 26	7 59	205 15
April 14, 1779,	5 26	46 48	157 00
May 3,	5 27	52 57	159 20
Cook and Bayly, Jan. 1,	5 31	19 26	205 23
Oct. 12,	5 33	50 57	157 50
Bayly, Dec. 24, 25, and 26, 1777, - - -	5 34	50 03	157 32
	5 34	51 56	202 57
	5 35	50 03	157 32
	5 36	1 58	202 59
Cook, Dec. 27,	5 37	50 03	157 32
Oct. 12, 1779,	5 41	9 42	205 10
Jan. 10, 1778,			Cook,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, Oct. 12, 1779,	5 41	50 57	157 50
April 15,	5 42	42 10	160 46
Dec. 27, 1777,	5 44	1 58	158 01
Jan. 5, 1778,	5 46	5 35	203 30
Aug. 21, 1779,	5 48	53 14	162 20
Jan. 5, 1778,	5 48	5 35	203 30
May 3,	5 50	57 57	159 20
Dec. 26, 1777,	5 50	1 57	203 00
Bayly, Jan. 7, 1778,	5 51	7 33	205 00
Oct. 15, 1779,	5 51	45 29	155 10
Aug. 21,	5 53	53 14	162 20
Jan. 8, 1778,	5 54	7 48	205 54
Jan. 12,	5 55	13 55	203 36
Oct. 15, 1779,	5 55	45 29	155 10
Cook, Oct. 14,	5 56	46 48	157 00
Jan. 12, 1778,	5 56	13 55	203 36
April 30, and May 3, 1770, -	5 57	52 57	159 20
Bayly, April 29, 1779,	6 00	52 46	159 45
	6 00	52 41	160 00
Cook and Bayly, Oct. 11,	6 00	51 03	158 50
May 3,	6 01	52 57	159 20
April 30,	6 03	52 58	159 20
May 20,	6 03	52 28	159 15
Cook, Oct. 12,	6 03	50 57	157 50
Dec. 26, 1767,	6 06	1 57	203 00
May 21, 1779,	6 06	52 58	159 15
April 30,	6 07	52 58	159 20
Aug. 21,	6 07	52 58	159 20
Oct. 14,	6 07	46 48	157 00
Bayly, Dec. 22, 1777,	6 08	0 24	203 30
Cook, Jan. 5, 1778,	6 08	5 35	203 30
Bayly, April 30, 1779,	6 09	52 38	159 20
April 27,	6 09	52 22	160 53

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, April 28, 1779,	6 10	52 28	159 45
May 3,	6 10	52 41	160 00
Dec. 22, 1777,	6 10	0 29	203 04
Jan. 5, 1778,	6 11	5 35	203 30
Oct. 12, 1779,	6 14	50 03	157 32
Oct. 14,	6 15	46 48	157 00
May 18,	6 16	52 28	159 15
Cook, Aug. 21,	6 16	53 14	162 20
Oct. 17,	6 18	1 58	202 59
Dec. 27, 1777,	6 19	1 56	202 57
Dec. 23,	6 20	1 01	203 01
Oct. 15, 1779,	6 20	45 29	155 15
Dec. 23, 1777,	6 20	1 01	203 11
Oct. 12,	6 21	50 57	157 50
Dec. 23,	6 21	1 55	202 56
Bayly on April 31, and May 21, 1779, - -	6 22	52 28	159 15
Cook, Jan. 5, 1778,	6 22	5 35	303 05
Jan. 11, 1779,	6 24	12 00	204 51
April 15,	6 24	42 10	160 46
Bayly, Jan. 5,	6 25	5 36	303 10
Dec. 27, 1777,	6 26	1 55	202 56
April 30, 1779,	6 27	52 58	159 20
Cook, Jan. 12, 1778,	6 27	13 55	203 30
Dec. 27, 1777,	6 27	1 55	202 56
Aug. 30, 1779,	6 28	52 57	159 29
Bayly, Oct. 11,	6 28	51 30	158 55
May 16,	6 28	52 28	159 15
Dec. 27, 1777,	6 29	1 58	202 59
April 18, 1779,	6 29	48 20	161 51
May 18,	6 30	52 28	159 15
Cook, Dec. 22, 1777,	6 31	0 29	203 04
April 17, 1779,	6 31	43 43	160 34
Dec. 22, 1777,	6 31	0 29	203 04

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, Jan. 7, 1778,	6 31	7 40	205 20
Jan. 8,	6 33	7 48	205 44
	6 34	7 48	205 44
Bayly, May 3, 1779,	6 36	52 41	160 00
April 15,	6 36	42 10	160 46
Jan. 1,	6 37	19 26	205 21
Jan. 7, 1778,	6 38	7 40	205 20
Jan. 8,	6 38	7 48	205 44
May 3, 1779,	6 39	52 57	159 20
Jan. 7, 1778,	6 39	7 40	205 20
Cook, Dec. 22, 1777,	6 39	0 29	203 04
Oct. 12, 1779,	6 40	50 57	157 50
	6 42	50 57	157 50
Jan. 7, 1778,	6 46	7 40	205 10
Cook and Bayly, Dec. 22, 1777, - -	6 47	0 29	203 04
Bayly, March 15, 1779,	6 47	52 41	160 00
Cook, Jan. 8, 1778,	6 47	7 48	205 34
	6 49	7 48	205 44
Jan. 7, 1779,	6 50	7 40	205 20
Jan. 1,	6 50	19 26	205 23
April 15,	6 51	42 10	160 46
Bayly, April 21,	6 52	50 39	162 37
Aug. 21,	6 52	53 14	162 10
Jan. 7, 1778,	6 53	7 40	205 20
Aug. 21, 1779,	6 53	53 14	162 10
Jan. 12,	6 53	13 55	203 36
Dec. 23, 1777,	6 55	1 01	203 01
Jan. 11, 1778,	6 56	12 00	204 51
Oct. 11, 1779,	6 56	51 57	159 00
Jan. 15, 1778,	6 59	18 01	201 35
Dec. 23, 1777,	6 59	1 01	203 01
Marion and Crozet, Sept. 1772, - -	7 00	13 26	144 25

Cook,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, Jan. 11, 1778,	7 00	12 00	204 51
Cook and Bayly, Dec. 27,	7 01	19 15	205 21
Jan. 12,	7 03	13 55	203 36
Dec. 22, 1777,	7 08	0 29	203 04
Cook, Jan. 1, 1779,	7 10	19 20	205 22
Dec. 23,	7 11	1 01	203 01
Dec. 27,	7 11	1 55	202 56
Bayly, Aug. 21,	7 13	53 14	162 10
	7 14	53 50	162 10
Dec. 27, 1778,	7 16	19 15	205 21
Jan. 1, 1779,	7 17	19 26	205 23
Cook and Bayly, Jan. 11, 1778, - - -	7 18	12 00	204 51
Dec. 27,	7 20	19 15	205 21
Bayly, April 18, 1779,	7 24	48 18	161 00
June 17,	7 24	52 44	160 16
Cook, Jan. 11, 1778,	7 27	12 00	204 51
April 18, 1779,	7 27	48 20	161 51
Dec. 27, 1777,	7 29	1 55	202 56
Dec. 27, 1778,	7 31	19 15	205 21
	7 31	19 15	205 21
Bayly, Dec. 27, 1777,	7 32	1 55	202 56
Jan. 10, 1779,	7 34	18 46	204 57
Jan. 11, 1778,	7 36	12 00	204 51
Jan. 1, 1779,	7 36	19 26	205 23
March 18,	7 43	48 20	161 51
Jan. 4, 1778,	7 45	19 29	206 30
March 27, 1779,	7 46	48 43	160 34
Jan. 4 and 5, 1778,	7 47	19 29	206 10
Jan. 5,	7 46	19 05	205 31
Dec. 27,	7 49	19 15	205 21
Jan. 1, 1779,	7 49	19 26	205 23
April 16,	7 52	42 50	160 41
Jan. 8, 1778,	7 55	7 48	205 34

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Jan. 3, 1778,	7 57	20 03	207 06
April 19, 1779,	7 58	49 40	161 31
April 7,	8 03	30 30	168 46
Nov. 29, 1778,	8 04	21 16	204 50
April 18, 1779,	8 10	48 20	161 51
Cook and Bayly, Jan. 13, 1778, - -	8 11	21 56	200 42
March 18, 1779,	8 12	21 12	195 38
Jan. 2, 1778,	8 13	20 05	205 07
Cook and Bayly, Nov. 30, 1778, - - -	8 13	20 05	205 07
Bayly, June 17, 1779,	8 13	52 45	159 41
Jan. 1, 2, and 3,	8 13	20 00	207 10
Jan. 15, 1778,	8 17	18 42	201 46
Jan. 1, 1779,	8 18	20 09	207 15
Nov. 23, 1778,	8 20	21 56	200 42
Nov. 3 and 29,	8 22	20 04	204 59
Jan. 15,	8 22	18 42	202 28
Jan. 1, 1779,	8 27	20 00	207 15
Jan. 15, 1778,	8 28	18 42	202 30
Cook, June 18, 1779,	8 28	18 38	201 41
Jan. 23,	8 28	21 56	200 42
June 18,	8 29	52 43	159 29
Nov. 29, 1778,	8 32	20 04	204 51
Jan. 15,	8 33	18 01	201 45
March 18, 1779,	8 36	21 12	195 38
Jan. 27, 1778,	8 39	21 22	200 44
June 18, 1779,	8 40	52 43	159 29
Nov. 29, 1778,	8 44	21 16	204 50
Jan. 19, 1778,	8 46	21 54	200 42
June 18, 1779,	8 46	52 43	159 29
Jan. 15, 1778,	8 47	18 01	201 45
Jan. 27,	8 49	21 22	200 34
Jan. 19,	8 52	21 56	200 40

Cook,

By whom observed in 1767, *to* 1779.	Varia E.		Lat. N.		Long. E.	
	°	′	°	′	°	′
Cook, Jan. 20, 1778,	8	52	21	44	200	30
April 7, 1779,	8	52	30	30	168	46
Cook and Bayly, March 18,	8	53	21	12	195	38
June 18,	8	53	52	43	159	29
Jan. 15, 1778,	8	54	18	01	201	45
Cook, April 7, 1779,	8	55	18	38	201	41
	8	56	18	38	201	41
In April,	8	56	30	30	168	46
June 18,	8	59	52	43	159	29
Bayly, Feb. 25,	8	59	21	03	203	28
Jan. 15, 1778,	9	00	18	01	201	45
Jan. 16,	9	00	20	04	201	20
June 20, 1779,	9	01	55	13	163	36
Jan. 17, 1778,	9	01	21	08	201	19
April 7, 1779,	9	02	30	30	168	40
June 18,	9	02	52	43	159	29
April 7,	9	05	30	30	168	40
June 18,	9	06	52	43	159	29
Cook, March 18,	9	09	21	12	195	38
April 20,	9	10	49	54	161	32
Bayly, Nov. 29, 1778,	9	12	21	16	204	50
Jan. 27, 1778,	9	13	21	22	200	34
Feb. 24, 1779,	9	13	20	36	203	38
Cook, Nov. 29, 1778,	9	14	21	16	204	50
June 20, 1779,	9	15	55	13	163	36
	9	15	55	49	164	20
April 7,	9	16	30	30	168	46
Bayly, Jan. 28, 1778,	9	16	21	35	200	30
Nov. 29,	9	18	21	16	204	50
March 17, 1779,	9	20	21	13	197	12
June 20,	9	20	55	34	164	00
Jan. 25, 1778,	9	21	21	26	200	30
June 21, 1779,	9	21	56	01	164	42
Cook, Jan. 15, 1778,	9	21	18	19	201	43

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook and Bayly, April 7, 1779, - -	9 22	30 30	168 46
April 20,	9 22	49 54	161 32
Jan. 27, 1778,	9 23	21 22	200 34
	9 24	21 07	201 05
Bayly, June 20, 1779,	9 24	55 13	163 36
Jan. 15, 1778,	9 26	18 38	201 41
Feb. 2,	9 26	22 47	200 30
Feb. 4,	9 26	24 48	199 39
June 8, 1779,	9 26	49 54	161 33
March 18,	9 26	21 12	195 38
Aug. 16,	9 29	53 54	171 02
Jan. 18, 1778,	9 29	21 20	201 05
April 18, 1779,	9 32	21 12	195 38
June 18, 1778,	9 33	52 43	159 29
Jan. 18,	9 35	21 34	200 45
Feb. 4,	9 35	24 30	199 39
June 20, 1779,	9 35	55 13	163 36
June 18,	9 36	52 43	159 29
Jan. 26, 1778,	9 37	21 36	200 30
June 21, 1779,	9 37	56 01	164 42
June 17, 1778,	9 39	21 18	201 19
April 20, 1779,	9 41	49 54	161 32
June 18,	9 41	52 43	159 29
Cook, Jan. 17, 1778,	9 41	21 08	201 19
June 18, 1779,	9 42	52 44	159 29
April 2,	9 43	49 54	161 32
Bayly, Feb. 3, 1778,	9 44	24 13	199 40
Jan. 8, 1779,	9 44	18 58	204 30
March 17,	9 45	21 13	159 38
Cook, Jan. 20,	9 45	55 13	163 36
Aug. 17, 1779,	9 47	21 42	168 34
Bayly, March 18,	9 51	21 13	196 40
Cook, Jan. 17, 1778,	9 51	21 08	201 19

Cook,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, June 21, 1779,	9 52	56 01	164 42
Jan. 23, 1778,	9 53	21 56	200 50
Aug. 17, 1779,	9 55	53 42	168 34
June 21,	9 56	56 01	164 42
Aug. 17,	9 58	56 01	164 42
Jan. 15, 1778,	9 59	18 38	201 41
Bayly, Aug. 17, 1779,	10 00	53 42	168 41
Nov. 29,	10 00	21 16	204 50
Marion and Crozet, in 1772,	10 00	18 00	179 38
Bayly, April 8, 1779,	10 03	30 51	167 31
Jan. 6,	10 03	19 25	204 20
March 16,	10 03	21 00	199 11
Cook, March 17,	10 03	21 13	197 12
Nov. 29, 1778,	10 07	21 16	204 50
June 21, 1779,	10 08	56 01	164 42
Jan. 17, 1778,	10 09	21 08	201 19
Jan. 28,	10 09	21 29	200 30
Jan 15,	10 10	18 01	201 45
Jan. 17,	10 10	21 08	201 19
Jan. 6, 1779,	10 11	18 57	204 45
Bayly, June 21,	10 11	56 06	164 33
Jan. 19, 1778,	10 11	21 57	200 58
Feb. 3,	10 14	24 13	200 20
March 5, 1779,	10 14	21 57	200 31
April 7,	10 15	30 08	168 51
March 5,	10 15	21 57	200 31
Jan. 27, 1778,	10 16	19 03	200 34
Jan. 13, 1779,	10 16	19 03	204 42
April 7,	10 16	30 08	168 51
March 17,	10 16	21 13	197 12
Feb. 3, 1778,	24 13	24 13	200 20
Cook and Bayly, March 18, 1779, - -	10 19	21 12	195 38
Jan. 27, 1778,	10 20	21 22	200 34

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook and Bayly, Mar. 17, 1779,	10 20	21 13	197 12
Feb. 14, 1778,	10 22	31 39	206 33
March 17, 1779,	10 24	21 13	197 12
April 20,	10 24	49 54	161 32
Bayly, Feb. 28,	10 25	21 59	201 04
March 5,	10 28	21 57	200 31
Cook, Jan. 15,	10 29	18 01	201 45
Aug. 17,	10 30	53 42	168 34
March 5,	10 32	21 57	200 31
June 20,	10 36	55 13	163 36
June 15, 1778,	10 37	18 01	201 45
Bayly, March 10, 1779,	10 37	20 56	194 42
March 17,	10 39	21 16	197 18
Jan. 28, 1778,	10 40	21 36	200 27
March 5, 1779,	10 40	21 57	200 31
March 2,	10 41	20 41	193 18
March 21,	10 41	20 32	192 42
Feb. 14, 1778,	10 41	31 39	206 33
Aug. 12, 1779,	10 42	56 12	175 30
March 5,	10 42	21 57	200 31
June 20,	10 43	55 13	163 36
July 11,	10 43	57 14	173 03
Feb. 27, 1779,	10 46	22 13	202 24
March 24,	10 46	19 57	186 15
March 12,	10 50	21 49	200 48
Cook, Aug. 12,	10 51	56 12	175 30
March 24,	10 51	19 54	186 15
March 12,	10 54	21 49	200 48
March 21,	10 54	20 34	192 28
March 12,	10 59	21 49	200 48
March 20,	10 59	20 41	168 49
March 27,	10 59	19 51	182 51
Bayly, April 9,	11 00	30 27	168 49
Auguſt 10,	11 00	57 33	176 22

Cook,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, March 20,	11 00	20 41	193 18
Feb. 17, 1778,	11 02	36 10	207 15
Feb. 14,	11 03	31 39	206 33
Feb. 3,	11 04	24 12	200 20
Jan. 28,	11 04	21 36	200 27
April 12, 1779,	11 08	56 12	175 30
Jan. 19, 1778,	11 09	21 57	200 58
March 28, 1779,	11 09	19 57	186 26
April 1,	11 09	22 23	180 01
March 12,	11 10	21 49	199 58
March 21,	11 12	20 34	192 28
March 12,	11 14	21 49	199 58
March 20,	11 15	20 41	193 18
Jan. 19, 1778,	11 16	21 57	200 58
Bayly, June 23, 1779,	11 16	58 09	166 16
Feb. 14, 1778,	11 17	58 09	206 33
March 24, 1779,	11 17	19 57	186 15
Cook and Bayly, March 21,	11 20	20 34	192 28
Feb. 3, 1778,	11 20	24 13	200 20
April 1, 1779,	11 21	22 23	180 01
March 20,	11 22	21 49	199 58
March 24,	11 23	19 57	186 15
March 12,	11 24	21 49	200 02
March 21,	11 25	20 34	192 28
Bayly, Aug. 12,	11 27	55 32	171 10
March 28,	11 28	20 15	181 00
Feb. 6, 1778,	11 29	28 39	200 39
Feb. 3,	11 30	24 13	200 07
March 23, 1779,	11 32	19 52	189 12
March 27,	11 33	19 51	182 51
Cook, March 24,	11 33	19 57	186 20
April 1,	11 33	12 23	180 01
Aug. 10,	11 34	57 3[illegible]	176 22
March 24,	11 35	19 57	186 15

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, Jan. 23, 1778,	11 35	21 56	200 52
Feb. 3,	11 35	24 13	200 20
Bayly, Aug. 12, 1779,	11 37	50 17	172 16
March 23,	11 37	19 57	186 26
Jan. 28, 1778,	11 38	21 36	200 27
Feb. 6,	11 39	28 35	200 21
Aug. 10, 1779,	11 39	57 32	174 48
Feb. 10, 1778,	11 41	31 39	206 33
May 21, 1779,	11 43	20 34	192 28
Aug. 12,	11 43	56 12	175 30
March 24,	11 48	19 59	186 40
March 25,	11 49	19 52	181 57
Cook and Bayly, Feb. 4, 1778,	11 49	24 50	200 07
Feb. 6,	11 50	28 39	200 39
Nov. 15,	11 53	22 55	204 50
March 21, 1779,	11 54	20 34	192 28
March 27,	11 54	19 51	182 51
Cook, Nov. 16, 1778,	11 56	22 25	204 50
March 23, 1779,	11 57	19 57	206 34
Nov. 16,	12 00	22 55	204 50
March 23,	12 01	19 57	196 26
Feb. 6, 1778,	12 01	28 39	200 39
Bayly, Feb. 9,	12 03	31 06	202 10
March 27, 1779,	12 03	20 02	181 19
March 24,	12 03	58 34	167 46
June 23,	12 05	58 06	167 30
Jan. 28, 1778,	12 06	21 36	200 27
Cook, March 12, 1779,	12 07	21 49	199 58
March 27,	12 07	19 50	183 05
Aug. 10,	12 08	57 33	176 22
Feb. 6, 1778,	12 10	28 39	200 39
June 23,	12 12	58 06	167 30
June 24,	12 12	58 37	168 40
Feb. 6,	12 13	28 39	200 39

Cook,

By whom observed in 1767, *to* 1779.	Varia. E.		Lat. N.		Long. E.	
	°	′	°	′	°	′
Cook, Feb. 4, 1778,	12	17	24	50	200	07
Bayly, Feb. 13,	12	20	31	33	206	39
March 26, 1779,	12	22	19	49	183	19
March 31,	12	22	20	38	180	30
June 24,	12	22	59	01	168	32
Nov. 24, 1778,	12	23	21	16	204	50
Feb. 8,	12	28	30	53	202	03
March 23, 1779,	12	32	19	57	186	26
Nov. 14, 1778,	12	39	33	46	207	56
Feb. 13,	12	41	31	30	206	34
Cook, Feb. 4,	12	41	24	50	200	07
Feb. 17,	12	43	19	49	207	15
March 16, 1779,	12	44	19	49	183	19
Bayly, Feb. 17, 1778,	12	49	24	50	200	07
Nov. 14,	12	52	19	49	183	19
March 26, 1779,	12	52	19	49	183	19
April 3,	12	55	24	51	183	19
March 26,	12	56	19	49	183	19
Cook, June 24,	13	03	58	37	168	40
June 23,	13	03	58	06	167	30
Nov. 14, 1778,	13	03	21	16	204	50
June 24, 1779,	13	10	58	37	168	40
	13	13	58	37	168	40
Feb. 4, 1778,	13	15	24	50	200	07
June 23, 1769,	13	17	58	06	167	30
June 24,	13	18	58	02	167	30
	13	22	58	37	108	40
Feb. 9, 1778,	13	22	31	04	202	55
Feb. 8,	13	25	30	55	202	47
June 27, 1779,	13	29	30	55	202	47
Nov. 14,	13	30	21	16	204	50
Feb. 9,	13	30	31	04	202	55
June 24,	13	32	58	37	168	40
Cook, Feb. 17, 1778,	13	32	36	10	207	15

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Feb. 6, 1778,	13 34	24 50	200 07
Nov. 4,	13 34	21 16	204 50
June 27, 1779,	13 37	60 28	175 59
June 23,	13 38	58 06	167 30
Feb. 6, 1778,	13 40	28 39	200 39
June 24, 1779,	13 40	58 37	168 40
Feb. 17, 1778,	13 42	36 10	207 15
	13 46	36 06	206 26
Feb. 9,	13 48	31 04	202 55
June 23, 1779,	13 49	58 06	167 30
Cook, Feb. 9, 1778,	14 01	30 59	202 46
Bayly, Feb. 8,	14 13	30 55	202 37
Cook,	14 25	30 55	202 37
Feb. 9,	14 32	31 04	202 55
	14 36	31 04	202 55
Bayly, Feb. 19, 1777,	14 38	37 30	207 33
Feb. 8, 1778,	14 39	30 55	202 37
Feb. 9,	14 43	31 04	202 55
Feb. 18, 1777,	14 52	37 15	206 32
Feb. 21,	15 10	40 02	210 39
Nov. 8, 1778,	15 29	40 29	201 54
Feb. 19,	15 38	37 30	198 50
Feb. 8,	15 41	40 29	201 54
Feb. 22,	15 42	40 27	212 37
March 11,	15 47	43 37	235 34
Cook, Nov. 8,	16 01	40 29	201 54
	16 03	40 29	201 54
	16 06	40 29	201 54
Bayly, March 18,	16 08	44 44	234 46
Feb. 18,	16 10	37 15	206 45
March 19,	16 13	45 03	234 30
Nov. 8,	16 14	40 29	201 54
Feb. 20,	16 20	37 30	206 50
Feb. 22,	16 22	41 02	216 10

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Nov. 8, 1778,	16 22	40 20	202 45
March 7,	16 26	44 26	235 44
Aug. 13,	16 27	66 36	192 35
Feb. 20,	16 31	37 30	206 50
Nov. 8,	16 33	40 29	201 54
Feb. 22,	16 34	47 36	236 05
March 8,	16 38	43 50	235 47
Cook, March 22,	16 38	47 36	236 05
Bayly, Nov. 8,	16 40	40 33	202 42
Cook, Feb. 19,	16 42	37 22	207 47
Bayly, Feb. 17,	16 42	36 10	207 15
Feb. 24,	16 44	41 46	218 14
Feb. 21,	16 47	39 14	212 24
Feb. 18,	16 48	37 15	206 45
Feb. 21,	16 51	39 14	212 24
Feb. 19,	16 53	37 30	206 50
Feb. 18,	16 56	37 15	206 45
Nov. 7,	16 59	40 47	202 39
Feb. 19,	16 59	37 15	206 45
Cook, Feb. 20,	17 02	38 16	208 30
Feb. 18,	17 04	37 15	206 45
Bayly, Feb. 28,	17 05	44 27	227 45
Feb. 19,	17 06	37 30	206 50
Feb. 20,	17 08	38 16	208 30
Nov. 6,	17 12	42 13	211 47
Aug. 7, 1779,	17 12	56 16	181 18
June 29,	17 12	61 50	178 56
March 24, 1778,	17 15	47 47	326 04
March 27,	17 17	48 08	231 39
Feb. 21,	17 17	39 14	212 24
March 6,	17 22	44 30	235 25
March 19,	17 22	45 05	234 45
March 1,	17 30	44 55	229 16
July 27,	17 30	59 39	190 52

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.		Lat. N.		Long. E.	
	°	′	°	′	°	′
Bayly, Feb. 28, 1778,	17	33	44	46	228	10
Cook, Feb. 21,	17	36	39	14	212	24
	17	37	39	14	212	24
March 1,	17	38	39	14	212	24
Aug. 6, 1779,	17	40	59	47	184	52
Bayly, March 4, 1778,	17	42	43	57	232	10
Aug. 6, 1779,	17	42	59	47	184	53
Cook, March 17, 1778,	17	51	45	05	234	45
	17	54	45	05	234	45
Aug. 7, 1779,	17	56	59	27	185	07
Feb. 20, 1778,	17	56	59	27	185	07
March 19,	17	58	45	05	234	45
Aug. 7, 1779,	18	05	59	27	185	07
Aug. 6,	18	06	59	47	184	52
Cook and Bayly, March 19, 1778, - -	18	11	45	05	234	45
Aug. 6, 1779,	18	15	59	47	184	53
Bayly, March 2, 1778,	18	20	59	47	184	53
	18	20	44	50	229	18
Cook, Feb. 1,	18	21	39	14	212	24
Aug. 7, 1779,	18	25	59	37	185	00
Bayly, March 1,	18	26	41	51	229	20
Aug. 7,	18	26	59	30	183	50
Feb. 24, 1778,	18	29	39	14	212	24
June 28, 1779,	18	31	62	05	175	14
March 1, 1778,	18	31	44	52	228	48
July 27,	8	31	59	39	190	52
	18	34	59	39	190	52
Feb. 21,	18	34	39	14	212	24
Cook, July 27,	18	40	59	39	190	52
June 16,	18	44	55	37	202	09
July 27,	18	52	59	39	190	52
Feb. 21,	18	53	39	14	212	24
Aug. 7, 1779,	18	55	59	27	185	07

Cook,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, July 27, 1778,	18 56	59 39	190 52
Feb. 12,	18 12	40 25	213 00
Aug. 7, 1779,	19 01	59 27	185 07
July 13, 1778,	19 02	58 08	199 04
March 2,	19 06	44 47	229 19
July 25,	19 06	58 31	192 30
Aug. 1, 1779,	19 08	64 12	190 08
Bayly, July 26, 1778,	19 08	58 40	192 30
Feb. 22,	19 10	40 25	113 00
July 26,	19 11	58 49	192 30
Feb. 28,	19 12	44 46	228 48
Cook and Bayly, June 16,	19 13	55 37	202 09
Aug. 1, 1779,	19 04	64 12	190 08
March 27, 1778,	19 17	48 15	206 00
March 1,	19 19	44 52	228 48
Feb. 22,	19 29	40 25	213 00
Aug. 7, 1779,	19 31	59 27	185 07
Aug. 1,	19 34	64 12	190 08
July 27, 1778,	19 37	59 39	190 52
Cook, June 28,	19 37	62 10	177 36
Aug. 27,	19 39	48 15	206 00
Aug. 1, 1779,	19 42	64 12	206 00
	19 46	64 12	206 00
Aug. 7,	19 50	59 27	185 07
Feb. 28, 1778,	19 52	44 49	228 44
June 28,	19 55	62 10	177 26
Aug. 1,	20 02	64 12	190 08
Bayly, July 2,	20 04	54 34	194 20
June 28, 1779,	20 05	62 10	177 26
April 30, 1778,	20 15	53 38	227 25
June 21,	20 15	53 49	198 11
June 16,	20 16	55 37	202 09
June 18,	20 17	55 12	202 09
Sept. 22,	20 17	61 34	189 44

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Feb. 28, 1778,	20 17	44 46	228 40
	20 17	44 46	228 40
June 12,	20 18	55 37	202 09
Sept. 27,	20 20	58 38	189 46
June 12,	20 21	56 20	206 30
Oct. 10,	20 22	55 55	194 00
Cook, June 16,	20 23	55 37	202 09
Bayly, Oct. 12,	20 24	53 54	194 00
Oct. 11,	20 25	55 55	194 00
June 26,	20 25	53 51	194 23
Cook, June 28, 1779,	20 25	62 10	177 26
July 13,	20 25	58 08	199 04
Oct. 11,	20 28	53 55	194 00
Sept. 27, 1778,	20 29	58 39	290 00
April 30,	20 30	53 37	225 37
Bayly, June 28, 1779,	20 30	62 10	177 26
Cook, June 12, 1778,	20 30	56 20	206 30
Feb. 28,	20 31	44 46	228 40
	20 36	44 46	228 40
July 13,	20 37	58 08	199 04
Bayly, Oct. 27,	20 38	58 41	189 46
Cook, July 13,	20 39	58 08	199 04
June 12,	20 40	56 20	206 30
Bayly, June 21,	20 46	54 11	198 23
June 28,	20 48	62 10	177 26
Feb. 28,	20 48	44 46	228 40
April 29,	21 03	53 06	233 50
July 13,	21 07	58 08	199 04
Cook, April 30,	21 12	53 37	225 37
July 24, 1779,	21 12	68 43	187 32
April 30, 1778,	21 13	58 08	199 04
July 12,	21 14	58 31	200 33
July 13,	21 28	58 08	199 04
July 19,	21 30	59 37	197 57

Cook,

By whom observed in 1767, *to* 1770.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, June 28, 1779,	21 32	62 10	177 26
Cook and Bayly, July 24,	21 37	68 43	187 32
July 21,	21 37	68 43	187 32
July 17, 1778,	21 37	55 25	201 08
July 24, 1779,	21 38	68 43	187 32
June 16, 1778,	21 42	55 37	202 09
Cook, July 24, 1779,	21 47	68 43	188 32
Bayly, Sept. 21,	21 49	57 55	191 10
June 17,	21 50	55 57	202 08
April 30,	21 52	53 37	225 37
June 13,	21 52	56 40	206 20
July 12,	21 58	58 31	200 33
Sept. 30,	22 00	56 29	193 30
July 20, 1778,	22 02	59 37	198 00
July 5,	22 04	56 59	199 41
May 8,	22 04	59 26	227 51
June 16,	22 06	55 37	202 09
July 24, 1779,	22 07	68 43	187 32
June 17, 1778,	22 07	55 25	201 08
July 20,	22 09	59 37	197 57
	22 13	59 37	197 57
Sept. 29,	22 15	56 37	192 52
May 8,	22 15	59 26	227 51
July 6,	22 19	56 57	200 01
Sept. 19,	22 20	63 49	193 53
July 9,	22 20	55 18	202 07
May 22,	22 20	55 12	225 27
June 16,	22 21	55 47	203 00
July 31, 1779,	64 56	64 56	189 48
Cook, Sept. 19, 1778,	22 23	63 49	193 53
Cook and Bayly, July 20,	22 23	59 37	197 57
May 5,	22 23	58 58	221 21
Cook, June 17,	22 24	55 25	201 08
July 19,	22 25	59 37	197 53

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, July 12, 1778,	22 25	58 31	200 33
May 8,	22 25	59 26	227 51
July 8,	22 27	59 26	227 51
July 24,	22 27	68 43	187 32
Bayly, July 31, 1779,	22 32	64 35	190 06
Cook, May 5, 1778,	22 32	58 58	221 14
June 17,	22 32	55 25	201 08
July 12,	22 32	58 31	200 33
July 6,	22 34	56 56	200 19
July 31, 1779,	22 34	64 56	190 47
May 8, 1778,	22 34	56 26	225 51
Bayly, July 29,	22 41	60 18	198 08
May 3,	22 43	58 58	221 14
Aug. 2, 1779,	22 44	64 05	203 00
July 9, 1778,	22 45	59 38	202 07
July 20,	22 45	59 38	198 03
Cook, July 20,	22 45	59 37	197 57
June 17,	22 46	55 25	201 08
July 31, 1779,	22 46	64 56	189 48
July 20, 1778,	22 46	59 37	197 57
July 16,	22 47	58 46	198 42
July 9,	22 47	55 18	202 07
July 19,	22 47	59 37	197 53
Bayly and Cook, July 20,	22 47	59 37	197 57
Bayly, July 31,	22 48	61 54	190 00
Cook, July 9,	22 48	55 18	202 07
May 24,	22 49	58 16	208 42
July 31, 1779,	22 52	64 56	189 48
July 9, 1778,	22 53	55 18	202 07
May 20,	22 54	59 39	211 22
July 9,	22 55	55 18	202 07
May 8,	22 55	59 26	227 51
July 31,	22 56	64 56	189 48
June 17,	22 59	55 25	201 08

Cook,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, Aug. 2, 1779,	23 00	64 56	189 48
July 12, 1778,	23 04	58 31	200 32
	23 08	58 31	200 32
Bayly, May 1,	23 09	56 26	224 52
May 5,	23 09	58 53	221 14
July 9,	23 09	55 18	202 07
July 16,	23 09	58 31	199 07
May 2,	23 11	57 17	224 40
July 15,	23 14	58 29	199 10
May 5,	23 14	58 53	221 14
Sept. 11,	23 15	64 20	199 37
June 17,	23 19	55 25	201 08
June 19,	23 22	59 37	197 53
July 12,	23 22	58 31	200 33
May 20,	23 25	59 39	211 22
July 3, 1779,	23 27	63 42	187 25
May 3, 1778,	23 27	58 14	221 11
Cook and Bayly, July 14,	23 28	58 18	199 10
May 1,	23 29	55 12	225 30
May 3,	23 31	58 14	221 11
July 19,	23 32	59 37	197 53
Cook, July 31, 1779,	23 34	64 56	189 47
July 19,	23 34	59 37	197 53
Bayly, July 9, 1778,	23 37	58 11	202 28
June 30, 1779,	23 37	65 36	191 50
Cook, May 20, 1778,	23 41	59 35	211 22
Bayly, June 12,	23 45	57 01	206 55
July 12,	23 44	58 20	201 10
Sept. 11,	23 46	64 20	199 37
May 20,	23 46	59 39	211 22
Aug. 2, 1779,	23 47	64 05	190 47
May 20, 1778,	23 48	59 39	211 21
July 7,	23 49	57 13	200 53
Sept. 4,	23 55	64 26	189 06

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, May 6, 1778,	23 55	59 09	220 37
July 31, 1779,	23 57	65 01	189 57
Sept. 11, 1778,	23 57	64 20	199 37
May 20,	23 57	59 22	110 08
July 12,	23 58	58 23	201 07
Aug. 2, 1779,	23 59	64 04	190 13
May 20, 1778,	24 02	59 39	211 22
Sept. 1,	24 03	64 20	197 20
July 10,	24 08	58 16	202 19
Cook, May 1,	24 09	55 12	225 20
July 12,	24 11	58 27	201 05
Bayly, Sept. 4,	24 11	64 29	188 17
Cook and Bayly, May 20,	24 11	59 39	211 22
July 19,	24 12	59 37	197 53
July 20,	24 12	59 37	197 57
May 1,	24 12	55 12	225 30
May 6,	24 13	59 09	220 37
May 3,	24 17	58 14	221 11
Aug. 2, 1779,	24 22	64 05	190 47
May 21, 1778,	24 22	59 22	210 22
Bayly, Aug. 9, 1779,	24 07	65 35	191 50
May 3, 1778,	24 29	58 14	221 11
Cook, May 6,	24 29	59 09	220 37
May 6,	24 26	59 09	220 37
May 3, 4, and 5,	24 30	58 27	221 15
May 6,	24 36	59 09	220 47
May 21,	24 36	59 22	210 22
	24 37	59 22	210 22
	24 39	59 22	210 22
May 3,	24 40	58 14	221 11
Aug. 2, 1779,	24 42	58 14	221 11
	24 43	64 05	190 47
July 10,	24 44	58 17	202 01
Bayly, Aug. 9,	24 45	65 36	190 45

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Sept. 3, 1779,	24 47	64 55	188 40
May 6,	24 49	59 09	220 37
	24 50	59 09	220 37
Sept. 6,	24 50	64 13	195 10
May 1,	24 52	55 12	225 30
May 2,	24 52	55 12	225 30
May 5,	24 55	58 53	221 14
Cook and Bayly, May 6,	24 59	59 09	200 37
Bayly, Sept. 7,	25 01	64 21	184 30
Cook, Sept. 4,	25 01	64 26	190 06
May 21,	25 03	59 22	210 22
	25 06	59 22	210 22
Sept. 6,	25 06	64 13	195 10
July 19,	25 07	59 37	197 53
May 1,	25 08	55 12	225 20
Bayly, Sept. 3,	25 12	65 24	189 20
Cook, Sept. 6,	25 12	63 58	194 42
July 10,	25 14	67 58	189 33
Sept. 19,	25 17	63 47	196 08
Aug. 12, 1778,	25 24	66 17	211 19
Sept. 5,	25 26	63 55	190 09
Aug. 27,	25 29	69 20	183 30
Sept. 2,	25 30	65 40	190 00
Aug. 13,	25 32	66 36	192 25
July 12, 1779,	25 33	69 02	210 50
Bayly, Aug. 10, 1778,	25 36	66 00	210 40
May 23,	25 37	58 14	205 27
Sept. 4,	25 37	64 26	189 06
May 4,	25 38	58 35	221 22
Sept. 4,	25 38	64 26	189 06
July 9, 1779,	25 39	69 05	188 48
Aug. 2,	25 40	64 05	190 47
July 12,	25 45	69 02	190 50
Sept. 6,	25 45	63 58	184 40

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, Aug. 2, 1779,	25 50	64 05	190 47
Cook and Bayly, July 14,	25 54	68 51	189 05
May 14, 1778,	25 54	58 35	221 22
	25 55	58 35	221 22
Cook, Aug. 27,	25 56	69 20	183 30
Sept. 6,	25 57	64 13	195 00
	25 58	64 13	195 00
Aug. 2, 1779,	25 59	64 05	190 47
July 7, 1778,	26 02	57 0-	200 42
Sept. 6,	26 03	64 13	195 00
July 12, 1779,	26 10	69 02	190 50
July 7, 1778,	26 13	57 07	200 42
July 12, 1779,	26 14	69 02	190 50
Bayly, May 24,	26 16	58 16	203 14
Cook, Sept. 11, 1778,	26 16	64 20	199 37
Bayly, May 3,	26 21	58 11	222 50
May 5,	26 21	58 49	221 26
May 4,	26 22	58 30	221 00
Aug. 13,	26 22	66 33	192 19
July 12, 1779,	26 22	69 02	190 50
July 7, 1778,	26 22	57 07	200 42
Aug. 27,	26 23	69 20	183 30
July 7,	26 23	57 07	200 42
Sept. 2,	26 24	66 30	189 42
July 27, 1779,	26 24	67 11	189 05
May 4, 1778,	26 25	58 35	221 22
Sept. 6,	26 25	63 58	194 42
July 7,	26 29	57 07	198 42
Aug. 10,	26 33	65 43	189 56
May 4,	26 34	58 35	221 22
Cook and Bayly, July 12,	26 34	69 02	189 50
Bayly, May 4, 1778,	26 35	58 32	221 15
May 8,	26 35	59 33	218 53
July, 12, 1779,	26 35	69 02	189 50

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, July 21, 1779,	26 35	69 32	198 39
July 7, 1778,	26 36	57 07	200 42
Aug. 13,	20 37	66 36	202 35
July 4,	26 39	60 01	207 56
May 4,	26 40	58 35	221 22
May 7,	26 42	59 28	219 58
Sept. 6,	26 42	63 58	194 42
May 9,	26 48	59 31	117 45
Sept. 1,	26 48	66 50	187 39
Sept. 15,	26 50	64 20	197 20
July 11, 1779,	26 50	68 06	190 15
Aug. 20, 1778,	26 55	69 20	183 25
Sept. 6,	26 56	63 58	194 42
May 6,	26 59	59 23	221 27
Sept. 12,	27 00	64 32	198 13
Aug. 10,	27 00	65 43	189 56
Sept. 15,	27 04	64 20	197 20
Sept. 6,	27 05	63 58	194 42
	27 06	63 58	194 42
July 27, 1779,	27 08	68 06	190 15
Aug. 13, 1778,	27 11	66 36	192 35
Cook and Bayly, May 19,	27 15	60 12	212 42
Aug. 13,	27 16	66 36	192 25
Bayly, Aug. 24,	27 17	69 17	190 18
Sept. 15,	27 21	64 22	197 56
Bayly, Sept. 8,	27 22	64 21	196 20
Cook, Aug. 10,	27 22	65 43	189 56
Sept. 15,	27 23	64 20	197 20
Sept. 16,	27 25	64 22	197 56
Sept. 15,	27 28	64 20	197 20
Sept. 6,	27 29	63 58	194 42
Sept. 10,	27 30	64 27	198 13
Aug. 10,	27 31	65 43	189 56
Sept. 1,	27 32	66 47	190 13

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Cook, July 11, 1779,	27 32	68 06	190 15
Bayly, July 10, 12, 15, 16, and 17, 1778,	27 37	64 52	197 56
Aug. 10,	27 39	65 43	189 56
June 5,	27 41	59 00	207 44
July 11, 1779,	27 42	68 06	190 15
July 12,	27 46	69 33	189 40
July 11,	27 46	68 06	190 15
Aug. 13, 1778,	27 50	66 36	192 30
	27 50	66 36	192 30
July 11, 1779,	27 53	68 06	190 15
Cook, Sept. 1, 1778,	27 53	66 47	190 05
	27 55	68 06	190 15
Aug. 10,	27 58	65 43	189 56
July 19, 1779,	28 11	70 05	197 00
Sept. 1, 1778,	28 15	66 47	190 05
July 9, 1779,	28 17	69 05	188 50
Bayly, Sept. 18, 1778,	28 18	63 34	198 18
Sept. 15,	28 18	64 20	197 20
Sept. 9,	28 22	64 40	198 13
July 11, 1779,	28 27	68 06	189 55
Sept. 15, 1778,	28 31	64 20	197 20
July 9, 1779,	28 42	69 06	189 05
Sept. 17,	28 50	64 11	197 26
Cook, July 19,	28 59	70 05	197 00
	29 19	70 05	197 00
Sept. 15, 1778,	29 24	64 20	196 58
July 3,	29 25	61 11	208 30
July 9, 1779,	29 27	69 05	161 48
	29 29	70 05	196 58
June 1, 1778,	30 06	61 01	262 58
June 1,	30 14	61 01	209 00
Bayly, June 1,	30 20	61 01	208 59
Cook, July 9, 1779,	30 20	69 05	188 48

Bayly,

By whom observed in 1767, *to* 1779.	Varia. E.	Lat. N.	Long. E.
	° ′	° ′	° ′
Bayly, June 2, 1778,	30 21	60 43	208 52
Cook, July 9, 1779,	30 21	70 17	197 06
July 20,	30 28	69 38	196 19
July 9,	30 37	69 05	188 48
Bayly, Sept. 16, 1778,	30 47	64 20	196 37
July 9, 1779,	30 47	69 05	188 48
Cook, Aug. 20, 1778,	31 03	69 38	196 19
	31 04	69 38	196 19
Sept. 15,	31 04	64 20	196 37
July 17, 1779,	31 10	64 20	196 37
	31 19	70 17	197 06
Cook & Bayly, Aug. 20, 1778,	31 20	69 38	196 19
Sept. 15,	31 24	64 20	196 37
July 17, 1779,	31 28	70 17	197 06
	31 32	70 17	197 06
Aug. 20, 1778,	31 37	69 38	196 19
Sept. 15,	31 50	64 20	196 37
July 17, 1779,	31 56	70 17	197 06
Bayly, Aug. 19, 1778,	32 24	70 15	196 48
Aug. 21,	32 45	69 31	195 52
	33 00	69 31	196 03
Aug. 18,	33 03	70 25	198 34
	33 28	69 53	197 50
July 17,	33 37	70 16	193 54
	33 40	70 00	193 49
Aug. 16,	34 55	70 21	194 06
July 18, 1779,	35 30	70 20	196 38
July 17,	35 39	70 04	196 21
	35 40	70 04	196 21
Cook, July 17,	35 57	70 04	196 21
	36 10	70 04	196 21
	36 19	70 04	196 21

TABLES OF THE VARIATION OF THE MAGNETIC NEEDLE,

Observed at different Times in the Pacific Ocean, South of the Equator.

Longitude from the Meridian of London.

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Varia. E.
	° ′	° ′	° ′
Surville, Sept. 23, 1769,	0 00	148 55	6 00
Byron, in July, 1765,	1 18	186 44	11 15
Carteret, Sept. 21, 1776,	1 20	141 59	4 54
Bayly, Sept. 20,	1 33	142 52	4 40
Sept. 19,	1 44	143 32	4 40
Sept. 21, 1777,	1 48	203 10	5 31
Carteret, Sept. 19, 1767,	1 57	143 58	5 26
Sept. 16,	2 19	146 01	6 30
Bougainville, in 1776,	2 32	151 03	6 44
	3 10	152 29	7 15
Cook, Dec. 20, 1776,	3 13	204 02	4 57
	3 13	204 02	5 25
	3 13	204 02	5 42
Dec. 20, 1777,	3 13	204 02	5 49
	3 13	204 37	5 50
	3 13	204 02	6 05
	3 13	204 02	6 09
Dec. 19,	3 31	204 11	5 28

Cook,

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Varia. E.
	° ′	° ′	° ′
Cook, Dec. 19, 1777,	3 51	204 11	5 19
	3 51	204 11	5 22
	3 51	204 11	5 24
	3 51	204 11	6 04
	3 51	204 11	5 11
Bougainville, in 1766,	4 05	154 26	7 10
Bayly, Dec. 19, 1777,	4 39	204 57	5 07
Carteret, Aug. 20, 1767,	4 46	153 47	7 14
	5 00	152 49	5 20
Bougainville, in 1766,	5 00	155 25	7 15
Carteret, Aug. 24, 1767,	5 07	155 38	6 25
	5 07	155 38	6 30
Bayly, Dec. 18, 1777,	5 13	204 40	4 38
Carteret, Aug. 22,	6 24	158 02	7 42
Surville, Sept. 7, 1769,	6 36	154 22	9 00
Cook, Dec. 17, 1776,	7 21	104 51	4 49
	7 21	104 51	5 00
	7 21	104 51	5 15
	7 21	104 51	5 20
	7 21	104 51	5 28
	7 21	201 56	5 54
Bougainville, in 1776,	7 36	156 10	7 34
Carteret, Aug. 20, 1767,	7 53	159 26	8 31
	7 56	159 26	8 20
Cook, Aug. 2, 1777,	8 01	205 05	3 50
Dec. 16, 1767,	8 01	205 05	4 14
	8 01	205 05	4 15
	8 01	205 05	4 53
	8 01	205 05	5 35
Cook & Bayly, Dec. 16, 1777,	8 01	205 05	5 43
	8 01	205 05	5 43
Byron, June 29, 1765,	8 13	184 10	10 10
Carteret, Aug. 19, 1767,	8 52	161 11	8 30
Bayly, Dec. 15, 1777,	9 10	205 50	5 50

Cook,

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Vari. E.
	° ′	° ′	° ′
Cook, March 30, 1774,	9 24	234 29	1 27
April 1,	9 30	230 34	4 03
March 5,	9 32	223 52	4 27
Bayly, April 3,	9 32	227 12	4 40
Carteret, July 28, 1767,	9 50	189 04	9 04
July 30,	9 50	185 02	9 32
Aug. 1,	9 53	190 57	10 04
Aug. 18,	9 58	163 27	8 30
July 26,	10 01	193 28	9 00
Cook, Dec. 14, 1776,	10 09	205 58	4 06
	10 09	205 58	4 46
	10 09	205 58	5 13
	10 09	205 58	6 08
Bayly, Dec. 14,	10 09	205 58	5 08
Carteret, Aug. 2, 1767,	10 09	179 28	10 30
Cook, May 29, 1774,	10 10	243 30	1 57
Carteret, Aug. 4, 1767,	10 22	177 40	10 54
Cook, Dec. 14, 1777,	10 29	206 13	5 38
Carteret, Aug. 5, 1767,	10 35	176 20	10 52
	10 35	176 20	11 14
Cook, Aug. 21, 1770,	10 36	143 06	3 06
Carteret, Aug. 5, 1767,	10 40	165 19	11 00
Bayly, Dec. 14, 1777,	10 49	205 57	5 45
Cook,	10 49	206 28	5 10
In 1774,	10 49	206 28	5 52
In 1777,	10 49	206 28	6 26
	10 49	206 28	6 28
	10 49	206 28	6 28
Bayly,	10 49	206 28	5 32
	10 49	206 28	6 20
Carteret, Aug. 11, 1767,	10 49	167 30	10 38
Aug. 7,	10 52	172 53	11 17
Aug. 9,	10 56	171 30	10 02
	11 02	171 45	10 27

Bayly,

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Vari. E.
	° ′	° ′	° ′
Bayly, Dec. 13, 1777,	11 20	206 20	6 15
Bougainville, in 1766,	11 48	152 30	6 16
	11 56	151 13	6 01
	12 13	154 03	7 02
Carteret, July 25, 1767,	12 13	195 40	9 30
	12 13	195 40	9 40
Byron, June 20, 1765,	12 33	192 43	9 15
Cook, Aug. 17, 1770,	12 38	143 45	4 09
Bougainville, in 1766,	13 10	152 35	5 29
Cook, Dec. 11, 1776,	13 15	207 06	4 42
	13 15	207 06	5 01
	13 15	207 06	5 11
	13 15	207 06	5 21
	13 15	207 06	5 39
	13 15	207 06	5 48
Cook and Bayly,	13 15	207 06	5 44
Wallis, Aug. 17, 1767,	13 18	183 30	10 00
Byron, June 7, 1765,	14 05	215 32	4 30
Cook, Dec. 10, 1777,	14 07	208 00	6 08
	14 09	208 00	6 04
Byron, June 8, 1765,	14 10	215 38	4 03
Cook, Dec. 10, 1776,	14 17	208 00	4 45
	14 17	208 00	5 13
	14 17	208 00	5 35
Dec. 10, 1777,	14 09	208 00	6 04
Byron, June 8, 1765,	14 10	215 38	4 03
Cook, Dec. 10, 1776,	14 17	208 00	4 45
	14 17	208 00	4 13
	14 17	208 00	5 13
	14 17	208 00	5 35
	14 17	208 00	5 38
Byron, June 16, 1765,	14 28	204 07	7 40
Bougainville, in 1766,	14 28	185 32	9 21
	14 35	167 46	9 47

Cook,

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Vari. E.
	° ′	° ′	° ′
Cook, March 26, 1774,	14 41	240 10	2 10
Byron, in 1765,	14 41	211 15	5 00
Bougainville, in 1766,	14 42	204 35	7 00
	14 44	188 25	9 30
Bayly, Dec. 9, 1777,	14 47	208 17	6 17
Bougainville, in 1766,	14 55	192 46	9 21
	14 56	200 34	7 33
Byron, June 13, 1765,	15 00	209 37	5 30
Bougainville, in 1766,	15 03	197 16	8 15
	15 04	207 55	6 30
	15 04	207 55	8 25
Bayly, July 15, 1774,	15 09	171 46	11 03
Bougainville, in 1766,	15 10	199 40	7 36
	15 13	171 05	10 40
Bayly, Dec. 9, 1777,	15 30	208 10	7 00
Bougainville, in 1766,	15 33	151 39	6 04
Bayly, July 14, 1773,	15 39	173 05	10 14
Bougainville, in 1766,	15 40	155 03	9 04
Wallis, Aug. 13, 1767,	15 50	185 50	9 00
	15 53	184 37	10 00
Marion and Crozet, in 1772,	16 00	185 25	8 30
Carteret, July 23, 1767,	16 22	197 58	6 05
Cook, July 13, 1773,	16 25	174 01	10 46
Wallis, July 31, 1767,	16 28	205 00	8 00
July 30,	16 46	205 17	7 40
Cook, March 24, 1774,	17 07	243 30	1 56
July 13, 1773,	17 16	216 36	6 48
March 8, 1769,	17 23	214 36	4 54
Wallis, July 2, 1767,	17 28	210 30	6 00
July 28,	17 28	209 26	6 30
July 4,	17 30	210 30	5 30
Bougainville, in 1766,	17 32	210 55	4 40
Cook, June 8, 1773,	17 32	204 29	7 55
Cook and Bayly, Sept. 18,	17 41	206 09	7 50

Bougain-

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Vari. E.
	° ′	° ′	° ′
Bougainville, in 1766,	17 43	217 12	4 10
Cook, Aug. 4, 1773,	17 45	212 14	5 10
Bougainville, in 1766,	17 47	218 21	4 50
Cook, March 7, 1769,	17 48	212 55	6 32
June 9, 1774,	17 48	203 47	8 10
Wallis, July 27, 1767,	17 48	211 15	6 00
June 17,	17 51	213 00	6 00
Cook, April 16, 1777,	18 04	164 02	6 45
Sept. 21, 1773,	18 04	204 08	7 26
April 16, 1777,	18 04	164 02	7 39
June 16, 1774,	18 04	197 20	9 16
Cook and Bayly, Apr. 16, 1777,	18 04	164 02	7 14
	18 04	164 02	7 20
Bayly,	18 04	164 02	7 36
	18 03	164 02	8 18
Cook, April 16,	18 05	164 09	7 59
Cook and Bayly,	18 06	164 07	8 00
Bayly,	18 06	164 16	8 24
	18 06	164 16	8 46
	18 06	164 16	8 56
Cook,	18 06	164 16	8 14
	18 06	164 16	8 37
Bayly, April 14,	18 07	195 50	7 27
April 11,	18 15	196 34	8 02
Cook, March 5, 1769,	18 23	209 18	5 38
June 19, 1774,	18 25	193 19	10 22
July 11, 1773,	18 26	175 30	10 22
Byron, Oct. 10, 1765,	18 33	223 40	5 10
Cook, June 14, 1774,	18 35	197 45	9 15
Bougainville, in 1766,	18 39	214 48	5 43
	18 40	225 13	3 40
Cook, Sept. 22, 1777,	18 40	203 12	7 56
Bougainville, in 1766,	18 41	227 29	3 53
Byron, July 21, 1765,	18 43	202 03	7 38

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Varia. E.
	° ′	° ′	° ′
Bougainville, in 1766,	18 45	227 57	3 44
Cook, March 4, 1769,	18 47	221 02	2 54
Bougainville, in 1766,	18 50	235 53	2 33
	18 53	231 47	2 32
	18 54	230 31	2 50
Wallis, June 13, 1767,	19 00	220 24	7 00
Bayly, April 8, 1777,	19 01	198 36	7 52
	19 02	161 10	7 36
Cook, April 8,	19 02	161 10	7 10
	19 02	161 10	7 10
	19 02	161 10	7 22
Jan. 24,	19 02	161 10	7 26
April 8,	19 02	161 10	7 22
Carteret, July 20, 1767,	19 08	204 15	7 09
Wallis,	19 11	220 24	7 10
Cook, June 5, 1770,	19 12	147 30	5 35
Bayly, April 7,	19 12	199 00	7 56
Wallis, June 8, 1767,	19 18	222 16	5 20
June 13,	19 18	219 56	7 00
June 11,	19 20	222 00	6 00
Cook and Bayly, Apr. 24, 1777,	19 22	171 12	9 42
Bayly,	19 22	171 12	11 09
	19 22	171 12	9 58
	19 22	171 12	12 13
Wallis, June 7, 1767,	19 26	222 34	6 00
	19 30	130 40	5 40
Bayly, April 6,	19 32	199 41	7 27
Cook, May 18, 1777,	19 46	186 07	9 21
May 23,	19 46	186 09	10 44
July 3,	19 47	182 28	12 28
Carteret, July 19, 1767,	19 50	206 31	6 08
Bayly, July 10, 1774,	19 53	176 05	11 11
Cook and Bayly, June 5, 1777,	19 53	185 30	8 29
June 2,	19 53	195 26	7 46

Bayly,

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Vari. E.
	° ′	° ′	° ′
Bayly, June 6, 1777,	19 53	185 30	8 48
	19 53	185 30	10 09
Cook, June 6,	19 55	186 10	9 07
April 1,	19 59	158 57	3 42
	19 57	158 57	8 20
Bayly, April 1,	19 57	158 57	8 18
	19 57	158 57	8 23
	19 57	158 57	8 23
	19 57	158 57	7 02
April 2,	20 02	201 27	7 02
April 3,	20 04	201 29	7 44
May 13,	20 09	195 48	11 01
May 14,	20 11	194 55	10 13
Marion and Corzen, in 1772,	20 09	184 55	11 45
Cook, July 9, 1773,	20 14	176 45	13 08
May 13,	20 15	175 15	7 25
	20 15	175 15	7 36
	20 15	175 15	7 53
	20 15	175 15	7 55
	20 15	175 15	8 13
Cook and Bayly, May 13, 1777,	20 15	172 13	7 15
	20 15	172 15	8 09
	20 15	172 15	8 32
April 16,	20 15	175 15	8 33
Bayly, May 13,	20 15	175 15	8 03
June 27, 1764,	20 15	185 29	9 47
Wallis, May 23, 1767,	20 20	248 24	5 00
Cook, June 26, 1774,	20 23	186 24	12 06
June 24,	20 24	186 51	11 40
Carteret, July 12, 1767,	20 36	214 51	4 10
Cook, July 5,	20 37	181 10	12 30
Carteret, July 12,	20 38	214 30	5 00
Wallis, June 1,	20 38	232 45	5 09
Cook, Sept. 27, 1773,	20 40	194 18	11 42

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Varia. E.
	° ′	° ′	° ′
Cook and Bayly, July 8, 1774,	20 40	177 48	12 59
Bayly, March 30, 1777,	20 43	201 50	6 50
	20 48	201 49	7 05
Cook,	20 43	201 51	7 21
Cook and Bayly, July 6, 1774,	20 56	180 00	12 44
Wallis, May 20, 1767,	21 00	253 43	5 00
Cook, March 21, 1774,	21 01	246 32	3 04
Bayly, Sept. 28, 1773,	21 03	192 01	9 44
March 31,	21 04	200 23	9 58
Carteret, July 13, 1767,	21 07	201 17	5 46
Byron, Oct. 19, 1765,	21 10	236 13	0 00
Bayly, Sept. 30, 1773,	21 10	187 57	9 04
Cook, Oct. 1, 1770,	21 21	186 16	10 40
Carteret, July 10, 1767,	21 38	218 54	4 20
July 15,	21 40	209 40	6 23
Cook, Aug. 3, 1773,	22 08	226 51	4 54
Carteret, July 22, 1767,	22 22	209 21	6 34
Cook, July 19, 1777,	22 25	186 56	8 41
Bayly, July 18,	22 35	186 20	8 43
March 27,	22 48	159 40	8 23
	22 50	159 40	8 19
	22 50	159 40	8 44
	22 50	159 40	9 52
Cook and Bayly,	22 50	159 40	8 11
	22 50	159 40	8 22
	22 50	159 40	9 03
	22 50	159 40	9 05
Cook,	22 50	159 40	6 42
	22 50	159 40	7 53
	22 50	159 40	8 44
	22 50	159 40	8 42
	22 50	159 40	8 36
	22 50	159 40	9 26
March 18, 1776,	23 00	247 29	3 05

Byron,

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Varia. E.
	° ′	° ′	° ′
Byron, May 14, 1765,	23 00	259 02	3 20
Bougainville, in 1766,	23 10	246 22	2 30
Cook, Oct. 2, 1774,	23 18	170 04	9 27
Bayly, March 26,	23 21	202 15	8 17
Bougainville, in 1766,	23 24	249 02	0 39
	23 30	250 24	3 00
Bayly, March 16, 1777,	23 36	161 08	9 52
March 15,	23 46	159 17	8 52
March 25,	23 46	159 17	8 22
July 8, 1767,	23 46	220 35	5 56
Cook & Bayly, Mar. 21, 1777,	23 46	159 17	7 45
March 25,	23 46	159 17	8 22
March 21,	23 46	159 17	8 31
March 25,	23 46	159 17	8 31
Cook, March 25,	23 46	159 17	8 16
	23 46	159 17	8 40
Bougainville, in 1766,	24 00	151 14	2 04
Carteret, July 17, 1767,	24 04	247 53	1 51
Bayly, Aug. 7, 1777,	24 06	210 50	7 30
Cook, July 7, 1767,	24 10	220 35	4 02
Carteret, July 7, 1777,	24 10	220 35	5 12
Byron, May 10, 1765,	24 30	262 45	4 45
Carteret, July 6, 1767,	24 32	222 59	4 16
July 3,	25 00	224 14	2 30
Cook and Bayly, Aug. 7, 1777,	25 00	209 45	7 49
Cook,	25 00	209 45	6 01
	25 00	209 45	6 39
	25 00	209 45	7 20
	25 00	209 45	7 52
Carteret, July 2, 1767,	25 02	226 55	2 46
April 8, 1777,	25 17	208 16	7 09
Cook and Bayly, Aug. 6,	25 17	208 16	8 09
Bayly,	25 17	208 16	7 30
	25 17	208 16	8 12

Cook,

By whom observed in 1766, *to* 1779.	Lat. S	Long. E.	Varia. E.
	° ′	° ′	° ′
Cook,	25 17	208 16	7 37
	25 17	208 16	7 45
	25 17	208 16	8 40
Carteret, July 4, 1767,	25 24	223 12	3 43
Bayly, March 3,	25 31	201 15	8 44
Bougainville, in 1766,	25 34	253 10	3 39
Bayly, July 24, 1777,	25 45	192 47	8 18
Carteret, June 1, 1767,	25 51	276 17	8 08
Bougainville, in 1766,	25 56	153 55	3 37
Cook, July 27, 1777,	25 57	195 30	8 12
Carteret, July 2, 1767,	26 00	229 35	2 32
Cook, March 18, 1774,	26 05	248 58	2 34
Bayly, March 21,	26 15	201 50	8 53
Carteret, June 10, 1766,	26 26	278 15	8 10
	26 30	262 05	5 40
Cook, June 26, 1777,	26 41	194 30	7 52
Bayly, Aug. 5,	26 44	207 09	8 06
Bougainville, in 1766,	26 50	256 00	3 00
Carteret, June 12, 1767,	26 53	260 09	4 13
Bayly, March 21, 1777,	27 01	158 58	7 03
March 20,	27 01	158 58	8 23
March 21,	27 01	158 58	9 01
Cook and Bayly, March 21,	27 01	158 58	8 45
Cook, March 21,	27 01	158 58	8 28
March 8, 1774,	27 04	256 32	4 31
Carteret, June 8, 1776,	27 20	262 39	5 45
June 7,	27 23	263 14	5 45
Bougainville, in 1766,	27 30	258 55	3 40
Bayly, March 21,	27 34	201 53	8 54
Cook, Aug. 1, 1777,	27 43	203 11	7 07
Bougainville, in 1766,	27 47	260 25	4 15
Cook, July 31,	27 51	201 20	7 44
July 27, 1773,	27 53	225 13	5 00
Carteret, June 20, 1767,	28 04	244 01	2 09

Carteret,

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Varia. E.
	° ′	° ′	° ′
Carteret, June 18, 1767,	28 07	246 35	2 00
June 16,	28 11	249 15	2 00
Wallis, May 4,	28 12	164 00	6 00
Cook, March 7, 1774,	28 20	258 27	4 45
Oct. 8, 1773,	28 25	170 56	13 09
Bayly, Oct. 14,	28 38	180 43	11 11
March 20, 1777,	28 46	201 15	10 09
Mean of three,	28 50	159 12	9 59
Cook, mean of three,	28 50	159 12	9 27
July 26, 1773,	28 53	226 00	5 03
Oct. 9,	28 54	169 54	13 09
Bayly, Oct. 10, 1774,	28 57	168 30	11 09
Cook and Bayly, Sept. 19, 1769,	29 00	199 01	8 32
Bayly, July 23,	29 22	226 18	5 34
Cook, March 6, 1774,	29 23	259 27	4 47
Carteret, April 28, 1767,	29 45	180 40	9 40
Cook, Oct. 15, 1773,	30 15	180 24	11 14
July 22,	31 06	226 18	5 21
March 2, 1774,	31 12	258 01	4 36
Bayly, Oct. 16,	31 41	180 02	11 02
Cook, May 10, 1770,	32 02	152 30	8 00
May 11,	32 02	153 00	9 10
March 1, 1774,	32 28	257 43	3 45
Bayly, Oct. 17, 1773,	32 41	180 58	10 49
Cook, Oct. 13,	32 55	168 50	10 00
Wallis, Dec. 26, 1775,	33 18	289 00	22 50
Bayly, Sept. 24, 1769,	33 18	187 39	10 48
Mean of two, Mar. 16,	33 36	161 08	9 25
Cook, mean of 6, Mar. 16, 1777.	33 36	161 08	9 57
Cook and Bayly, mean of two,	33 36	161 08	11 37
Carteret, in May, 1767,	33 40	281 38	11 00
	33 45	279 44	10 24
Bayly, Oct. 18, 1773,	33 48	180 51	10 49
March 15, 1777,	33 52	199 01	10 07

Cook,

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Varia. E.
	° ′	° ′	° ′
Cook, April 25, 1770,	34 29	151 54	8 48
Feb. 27, 1774,	34 53	257 57	3 44
April 24, 1770,	35 19	150 48	7 54
Oct. 4, 1774,	35 26	171 43	10 00
Bayly, Oct. 15,	35 32	171 25	10 18
Cook, April 19, 1770,	35 50	150 01	3 17
April 21,	36 18	150 35	10 40
Cook & Bayly, Sept. 29, 1773,	36 18	150 35	10 42
Bayly, July 19, 1777,	36 34	227 23	5 33
Bougainville, in 1766,	36 36	269 45	10 21
Cook, Feb. 26, 1774,	36 37	258 37	5 33
Bayly, Feb. 23,	37 40	263 28	9 51
Cook and Bayly, Oct. 5, 1769,	37 00	187 03	12 50
Cook,	37 00	186 30	14 02
Oct. 6,	37 00	179 30	15 04
Feb. 24, 1774,	37 25	262 30	8 10
Feb. 25,	37 52	258 52	6 38
Feb. 21,	37 54	266 25	8 00
July 18, 1773,	37 56	227 12	5 29
Carteret, Aug. 30, 1769,	38 20	213 24	7 09
Cook, April 11, 1770,	38 30	157 30	13 48
April 10,	38 51	157 47	11 25
Oct. 21, 1773,	39 06	179 08	1 12
Mean of five, March 7,	39 17	167 58	11 08
Bayly, mean of three,	39 17	167 58	11 26
Cook and Bayly, Mar. 7, 1777,	39 17	167 58	10 59
Bayly, March 5,	39 19	189 15	9 42
March 9,	39 23	195 18	8 55
Cook, April 13, 1770,	39 23	156 28	12 27
Mean of four, March 10, 1777,	39 24	164 28	11 45
Cook and Bayly,	39 24	164 28	9 00
March 10, 1774,	39 24	164 28	10 56
	39 24	164 28	10 41
	39 24	164 28	12 55

Bayly.

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Varia. E.
	° ′	° ′	° ′
Bayly, March 10, 1777,	39 24	164 08	9 54
March 8,	39 25	192 45	10 46
March 11,	39 30	199 04	10 15
Cook, April 14, 1770,	39 30	154 32	11 30
Bayly, March 11, 1777,	39 45	189 10	10 09
Cook, March 4, 1774,	39 56	159 31	4 50
Bayly, Feb. 10, 1777,	40 22	172 15	13 21
Cook and Bayly, mean of two,	40 36	174 04	12 43
Cook, mean of two,	40 36	174 04	13 24
April 11, 1770,	40 46	174 04	13 50
Feb. 10, 1777,	40 46	174 04	14 03
Bayly, March 5,	41 25	271 40	11 09
Cook, mean of four,	41 25	271 40	12 38
Mean of two, Feb. 27,	41 29	271 40	13 33
Cook and Bayly, mean of two,	41 29	271 40	12 46
Bougainville, in 1766,	42 03	228 15	3 02
Cook, mean of 4, Feb. 7, 1777,	42 04	168 02	13 07
Feb. 5,	42 29	167 39	11 34
Wallis, April 21, 1767,	42 30	164 44	12 00
Cook, July 13, 1770,	43 02	221 20	5 37
Jan. 30, 1777,	43 15	149 12	5 13
July 11, 1773,	43 16	220 21	5 18
Jan. 28, 1777,	43 21	148 23	5 53
March 5, 1774,	43 25	171 40	12 06
Mean of four, Jan. 21,	43 27	143 05	1 22
Cook and Bayly, Feb. 7,	43 27	176 29	12 52
Bayly, Jan. 20, 1776,	43 28	141 12	2 00
	43 29	141 20	2 09
Jan. 27, 1777,	43 30	141 35	4 00
Cook, (two sets) Jan. 22,	43 30	143 13	2 38
Jan. 11, 1773,	43 34	208 34	5 00
Bayly, Jan. 21, 1777,	43 35	142 54	1 50
Jan. 24,	43 41	147 55	5 56
Cook, Feb. 4, 1777,	43 43	161 58	9 37

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Vari. E.
	° ′	° ′	° ′
Cook, (two ſets) Feb. 4, 1777,	43 43	161 58	11 50
Feb. 24,	43 45	148 46	3 00
July 10, 1773,	43 46	216 17	3 00
Furneau, March 7,	43 47	141 45	1 13
Cook, Jan. 23, 1777,	43 48	147 36	5 51
Cook, (two ſets) Feb. 6,	43 49	165 33	13 33
Cook and Bayly,	43 49	165 33	12 43
Bayly,	43 49	165 33	13 12
Cook, Feb. 4,	43 54	156 17	12 00
Carteret, April 28, 1767,	44 27	279 06	15 10
Cook, June 22, 1773,	44 41	198 07	10 19
Feb. 2, 1777,	44 51	156 17	7 36
In May, 1773,	44 47	166 48	13 49
Carteret, April 26, 1767,	45 47	279 08	16 17
Bougainville, in 1766,	46 33	285 00	19 16
Cook, June 15, 1773,	46 46	186 30	3 00
March 23,	46 46	162 17	13 17
Jan. 11, 1774,	47 51	238 18	2 34
Carteret, April 20, 1767,	48 04	279 24	17 20
Cook, Feb. 15, 1777,	49 00	264 52	10 20
Jan. 8, 1774,	49 07	229 18	6 26
Jan. 12,	49 32	249 38	4 00
Feb. 17,	49 32	265 19	12 42
March 22, 1773,	49 55	159 58	13 59
Bougainville, in 1766,	50 02	279 49	18 00
Cook, Feb. 13, 1774,	50 13	264 29	14 30
Dec. 5, 1773,	50 15	180 14	18 25
Feb. 12, 1774,	50 15	265 12	13 30
Jan. 7,	50 36	227 12	6 36
Bayly, Nov. 15,	51 12	183 13	9 52
Byron, Jan. 10, 1765,	51 31	181 46	20 00
Jan. 8,	51 50	180 44	20 00
Bayly, Jan. 6, 1774,	52 00	224 58	7 07
Cook, March 20, 1773,	52 22	155 23	13 49

Bougain-

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Vari. E.
	° ′	° ′	° ′
Bougainville, in 1766,	52 22	282 11	19 00
Wallis, in the Straights of Magellan, in March, 1767,	52 22		23 00
Carteret, in Dec. 1766, at Elisabeth's Island in the Straights of Magellan,			22 56
Cook, in Dec. 1766,	52 23	182 28	22 00
Wallis, Dec. 17,	52 24	291 24	23 00
Cook, Nov. 18, 1774,	52 44	190 33	10 26
Wallis, April 11, 1767,	52 46	284 30	23 00
Feb. 18, in the Straights of Magellan, - -	53 05		22 40
Cook, Nov. 4, 1774,	53 15	239 48	3 22
Feb. 10,	53 17	263 06	15 17
Dec. 7,	53 19	251 42	5 01
Dec. 17,	53 21	284 13	20 06
Carteret, in Dec. 1766,	53 23	292 28	22 50
Cook, Dec. 14, 1774,	53 25	273 34	14 14
Dec. 16, 1773,	53 26	280 53	17 38
Wallis, Dec. 22, 1766,	53 30	290 39	22 40
Dec. 22, at Cape Quade, in the Straights of Magellan,			22 35
Cook, Dec. 1, 1774,	53 40	177 22	9 58
Wallis, Dec. 27, at York Bay, in the Straights of Magel.	53 40		22 30
Jan. 20, at Cape Holland, in the Straights of Magellan,	53 50		22 40
Jan. 23, in the Straights at Cape Gallant, - -	53 50		22 40
Cook, Oct. 20, 1774,	54 56	235 30	1 28
In Dec. 1776, at Cape Forward, in the Straights of Magellan, - -	54 03		22 10

By whom observed in 1766, *to* 1779.	Lat. S.	Long. E.	Vari. E.
	° ′	° ′	° ′
Wallis, Jan. 19, 1767, at the Straight's Mouth, -	54 03		22 40
Cook, in York Bay, in the Straights of Magellan,			22 22
At Port Famine, in the Straights,			22 22
Feb. 4, 1777,	55 00	244 13	12 31
March 19, 1773,	55 01	152 31	11 19
Feb. 25, 1774,	55 09	211 02	6 35
Nov. 23,	55 46	204 26	9 24
In Jan. 1769,	55 53	292 17	23 36
Jan. 16, 1774,	56 19	286 06	9 26
Bayly, Jan. 2,	57 58	223 18	11 12
Cook, March 16, 1773,	58 58	145 03	0 31
Dec. 31,	59 40	225 19	13 09
Jan. 26, 1779,	60 10	286 00	27 09
Dec. 11, 1773,	60 42	187 26	17 18
Cook and Bayly, Jan. 2, 1774,	62 09	247 36	10 50
Cook, Jan. 23,	62 22	250 08	11 15
Dec. 29, 1773,	62 24	222 37	13 46
Jan. 20, 1774,	62 34	244 06	10 24
Feb. 3,	62 42	260 46	22 55
Dec. 2, 1773,	62 46	190 04	19 13
Bayly, Dec. 18, 1777,	64 41	208 24	10 08
Cook, Dec. 19, 1773,	64 49	211 06	13 24
Feb. 4, 1774,	65 42	260 46	25 42
Feb. 3,	66 23	225 23	15 26
Dec. 2, 1773,	66 36	251 00	18 20
Jan. 29, 1774,	70 00	253 25	24 18

TABLES OF THE DIP

OF THE

MAGNETIC NEEDLE,

Observed at different Times in the Atlantic Ocean, North of the Equator.

Longitude E. from the Meridian of London.

By whom observed in 1766, *to* 1780.	Lat. N.	Long. E.	Dip. N end
	° ′	° ′	° ′
Bayly, Sept. 15, 1776,	0 42	247 06	24 21
Eekberg, in March, 1774,	0 49	340 54	26 45
	1 04	348 48	27 00
Cook, Aug. 13, 1776,	1 04	334 08	32 24
Bayly, June 11, 1780,	1 10	334 00	29 28
Eekberg, in March, 1774,	1 54	340 49	27 52
Cook, Aug. 30, 1776,	2 09	335 39	33 15
Eekberg, in April, 1775,	2 14	337 55	26 52
In March, 1774,	2 22	340 52	29 26
Cook, Aug. 29, 1776,	2 43	337 20	34 30
Aug. 17,	3 39	338 12	35 17
June 13, 1780,	3 48	334 40	32 52
Eekberg, in March, 1774,	3 49	340 52	30 48
Le Gentil, in 1771,	4 12	344 03	14 37
Bayly, Sept. 8, 1776,	4 24	346 40	31 16
Eekberg, in April, 1775,	4 28	336 37	31 52
Cook, Aug. 25, 1776,	5 02	340 20	37 25
June 16,	5 25	333 12	35 37

Le

By whom observed in 1766, *to* 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Le Gentil, in 1771,	5 40	345 35	10 45
Eekberg, in March, 1774,	5 55	340 19	34 30
Cook, Aug. 23, 1776,	6 02	339 48	38 03
Bayly, June 17, 1780,	6 26	334 35	39 00
Cook, Aug. 22, 1779,	6 31	339 33	39 24
Eekberg, in April, 1775,	6 43	334 51	38 22
Le Gentil, in 1771,	7 57	346 36	7 22
Eekberg, in March, 1774,	8 18	339 38	39 41
Le Gentil, in 1771,	8 50	0 48	4 52
Cook, Aug. 19,	8 50	337 52	42 19
Bayly, June 29, 1780,	9 43	321 28	43 26
Cook, June 23,	9 44	331 36	42 52
Aug. 18, 1776,	10 00	337 38	44 12
Le Gentil, in 1771,	10 02	252 23	0 45
	10 21	0 44	14 37
Eekberg, in March, 1774,	10 38	339 28	44 45
Bayly, Aug. 30, 1776,	11 00	337 00	44 39
Le Gentil, in 1771,	11 10	353 57	2 30
Cook, Aug. 16, 1776,	11 43	336 11	46 47
Aug. 15,	12 01	336 44	47 00
Le Gentil, in 1771,	12 13	334 34	44 00
	12 18	355 42	4 45
Eekberg, in March, 1774,	13 01	338 28	46 52
Le Gentil, in 1771,	13 12	333 50	46 30
	14 43	358 55	10 37
Eekberg, in March, 1774,	15 00	339 10	49 56
Cook, Aug. 12, 1776,	15 08	336 52	51 00
Chappe, in 1769,	15 12	296 37	47 15
Chappe,	15 12	303 24	48 55
Cook, June 28, 1780,	15 25	327 04	50 37
Eekberg, in May, 1775,	16 10	227 37	49 55
Bayly, Aug. 26, 1776,	16 20	336 48	51 14
Eekberg, in March, 1774,	16 40	339 10	53 00
Bayly, June 28, 1780,	16 45	325 36	51 37

Cook,

By whom observed in 1766, *to* 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Cook, Aug. 10, 1776,	17 02	338 30	52 34
Le Gentil, in 1771,	17 07	330 47	50 00
Chappe, in 1769,	17 47	286 35	46 30
	18 04	317 42	54 07
Le Gentil, in March, 1771,	18 23	330 11	51 37
Eekberg, in March, 1774,	18 34	338 29	55 07
Cook, Aug. 9, 1776,	19 17	340 02	55 01
July 1, 1780,	20 00	323 33	54 40
Le Gentil, in 1771,	20 01	329 14	53 37
Cook, Aug. 8, 1776,	20 47	340 54	56 15
Bayly, Aug. 23,	21 00	338 00	56 45
Eekberg, in March, 1774,	21 24	339 33	57 52
Chappe, in 1769,	22 18	274 39	49 00
Cook, Aug. 7, 1776,	22 25	341 30	57 25
Eekberg, in May, 1775,	22 51	324 33	59 30
Chappe, in 1769,	23 12	332 20	59 31
Bayly, July 4, 1780,	24 02	321 10	59 42
Cook, July 4,	24 04	321 45	59 07
Aug. 6, 1776,	24 24	342 19	59 00
Eekberg, in March, 1774,	24 25	340 01	60 11
In May, 1775,	26 11	324 41	61 15
Chappe, in 1769,	26 26	341 25	60 56
Le Gentil, in 1771,	26 34	325 47	58 45
Eekberg, in Feb. 1774,	27 36	341 40	62 11
Bayly, Aug. 19, 1776,	27 39	330 00	60 51
Eekberg, in May, 1775,	27 43	325 42	63 22
Chappe, in 1769,	27 46	345 19	60 01
Le Gentil, Aug. 4, 1776,	28 26	325 58	60 52
Cook,	28 30	344 10	61 52
Le Gentil, in 1771,	28 58	324 57	61 37
Cook, July 31, 1766,	29 18	344 03	62 17
Le Gentil, in 1771,	29 54	325 11	62 37
Eekberg, in Feb. 1774,	30 00	342 57	65 03
In May, 1775,	30 16	326 24	64 34

Le

By whom observed in 1766, *to* 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Le Gentil, in 1771,	31 06	325 11	63 15
Cook, July 12, 1780,	31 11	320 20	67 00
Eekberg, in Feb. 1774,	33 01	345 41	66 22
Bayly, Aug. 13, 1776,	33 10	343 21	65 29
July 13, 1780,	33 17	318 20	67 41
Aug. 12, 1776,	33 48	345 00	66 01
Eekberg, in May, 1775,	34 57	327 31	66 32
Cook, July 28, 1776,	34 57	346 22	66 12
Eekberg, in Feb. 1777,	35 41	344 33	67 11
Cook, July 11, 1780,	36 13	320 29	70 03
Chappe, in 1769,	36 31	353 51	72 25
Cook, July 27, 1776,	36 34	346 59	68 22
Bayly, July 21,	37 51	323 34	70 11
Eekberg, in Feb. 1774,	37 55	344 20	68 03
Le Gentil, in 1771,	38 15	324 50	68 37
Cook, July 22, 1776,	38 20	323 22	70 07
July 26,	38 53	348 29	70 30
Eekberg, in May, 1775,	39 24	328 51	68 49
Cook, July 9, 1780,	39 33	319 27	65 01
Bayly,	39 33	318 42	65 01
July 30,	39 57	328 53	72 52
Le Gentil, in 1771,	39 57	328 53	73 07
Bayly, July 27, 1780,	40 55	326 23	72 30
Cook, July 28,	41 09	329 11	72 07
Eekberg, in Feb. 1774,	41 15	344 31	69 37
Cook, July 22, 1776,	44 01	352 20	71 34
Eekberg, in May, 1775,	44 10	333 45	70 49
Feb. 1771,	44 30	345 33	71 11
May, 1775,	44 48	348 48	72 18
Bayly, Aug. 3, 1780,	45 08	335 59	73 24
Cook, Aug. 5,	45 50	341 12	72 15
Eekberg, in Feb. 1774,	48 30	343 28	72 15
A Paris,	48 50		71 35
Eekberg, in May, 1775,	49 17	355 22	72 11

Phipps,

By whom observed in 1766, *to* 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Phipps, June 5, 1773, off Harwich, - -			72 12
Eekberg, in Feb. 1774,	50 16	341 53	72 45
In May, 1775,	50 30	358 42	71 52
Phipps, June 2, 1773,	51 35	1 22	73 31
June 6,	52 22	1 48	73 22
Eekberg, in Feb. 1774,	52 24	341 19	73 30
Bayly, Aug. 11, 1780,	52 28	344 15	74 18
Le Gentil, at Berlin,	53 31		72 15
Bayly, 1780,	53 33	344 48	74 49
Eekberg, in Jan. 1774,	54 00	338 45	74 41
Bayly, Aug. 17, 1780,	56 10	347 50	76 39
Eekberg, in Jan. 1774,	57 08	342 52	76 17
	57 15	362 10	74 41
Bayly, Aug. 20, 1780,	58 48	355 08	76 28
Aug. 26,	58 56	356 59	75 52
Eekberg, in Jan. 1774,	59 39	352 34	76 48
At Peterſburg,	59 59		73 45
Phipps, June 14, 1773,	60 16	357 33	75 18
	60 16	357 33	73 30
	60 18	359 34	75 00
June 15,	60 19	360 13	74 52
June 16,	60 29	360 10	76 45
At Kola,	68 52		77 45
June 21,	69 02	360 30	79 04
June 22,	70 45	359 54	77 52
June 24,	73 22	4 30	80 35
June 30,	73 36	5 00	79 30
June 24,	73 40	359 53	80 35
June 26,	74 30	10 28	79 22
June 28,	77 48	7 40	81 07
June 29,	78 02	10 01	80 26
June 30,	78 08	9 58	79 30
June 24,	78 22	9 58	80 45

By whom observed in 1766, *to* 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Phipps, Sept. 30, 1773,	79 44	9 38	82 08
July 15,	79 50	10 33	82 00
July 9,	80 12	2 32	81 52
Aug. 29,	80 27	15 46	82 02

TABLES

TABLES OF THE DIP

OF THE

MAGNETIC NEEDLE,

Observed at different Times in the Atlantic Ocean, South of the Equator.

Longitude from the Meridian of London.

By whom observed in 1771, *to* 1780.	Lat. S.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Cook, Sept. 1, 1776,	0 00	332 52	30 03
Le Gentil, in 1771,	0 12	341 43	23 00
Cook, Jan. 11, 1780,	0 19	334 20	25 52
Bayly, Sept. 17,	0 49	346 03	21 45
Eekberg, in March, 1774,	1 09	340 52	25 18
Cook, Sept. 2, 1776,	1 32	231 52	27 51
Le Gentil, in 1771,	1 49	339 09	26 30
Eekberg, in April, 1775,	2 04	340 30	22 37
Le Gentil, in 1771,	2 30	342 44	18 22
Eekberg, in March, 1774,	2 40	340 28	22 30
Cook, June 9, 1780,	3 12	335 26	20 15
Sept. 3, 1776,	3 14	331 08	24 43
Bayly, Sept. 20, 1776,	3 23	342 10	17 34
Le Gentil, in 1771,	3 26	340 53	31 52
Cook, Sept. 4, 1776,	4 40	329 56	22 15
Bayly, June 8,	4 50	336 38	20 19
Cook, June 7, 1780,	4 50	337 50	15 00
Eekberg, in March, 1774,	5 03	337 30	16 26

By whom observed in 1771, *to* 1780.	Lat. S.	Long. E.	Dip. N.end
	° ′	° ′	° ′
Le Gentil, in 1771,	5 31	340 38	33 15
Bayly, Sept. 23,	7 00	340 10	13 36
Cook, Sept. 6, 1776,	7 03	330 09	17 57
Eekberg, in April, 1775,	7 06	345 32	15 52
In March, 1774,	7 18	339 24	13 41
Cook, Sept. 7, 1776,	8 10	326 30	14 17
Eekberg, in April, 1775,	8 50	347 12	12 41
Bayly, June 5, 1780,	8 51	339 49	11 15
Cook,	8 51	340 27	9 00
Sept. 9, 1776,	9 52	326 00	13 28
Eekberg, in March, 1774,	9 52	339 24	7 48
Bayly, Sept. 25, 1776,	10 00	338 55	7 41
Le Gentil, in 1771,	10 00	338 57	12 00
Eekberg, in April, 1775,	10 21	348 14	4 56
Bayly, June 5, 1780,	11 05	342 58	5 12
Cook, June 2,	11 15	343 15	2 30
Bayly, Sept. 28, 1777,	11 20	338 33	5 50
Cook, Sept. 10, 1776,	11 25	326 06	9 15
Eekberg, in April, 1775,	11 42	349 37	0 12
Bayly, June 1, 1780,	11 50	343 54	1 58
Cook, May 31,	12 00	344 18	0 12
Eekberg, in March, 1774,	12 02	339 27	3 56
Cook, May 31, 1780,	12 11	344 32	1 14
Eekberg, in March, 1774,	12 19	339 08	2 52
	12 32	350 47	3 30
Bayly, May 31, 1780,	12 37	344 38	0 53
Cook,	12 46	344 45	1 18
Bayly, May 30,	12 54	344 57	0 24
Eekberg, in March, 1774,	13 02	338 57	1 51
	13 21	338 50	0 03

It appears that the Dip changed from the N. end of the Needle to the S. end, in about the Lat. of 13° 30′ S. and Long. of 21° W. in 1774.

Bayly,

By whom observed in 1771, *to* 1780.	Lat. S.	Long. E.	Dip. S. end
	° ′	° ′	° ′
Bayly, Sept. 27, 1776,	13 20	337 30	1 25
May 30, 1780,	13 33	345 32	1 51
Cook,	13 39	345 38	4 41
Bayly, May 29,	13 47	345 56	2 48
Eekberg, in April, 1775,	13 54	351 54	4 45
In March, 1774,	13 57	338 46	0 37
	14 29	338 52	2 12
In April, 1775,	14 43	352 43	6 56
Bayly, May 28, 1780,	14 50	347 16	6 06
Sept. 27, 1776,	14 51	337 14	1 16
	14 51	337 14	1 36
Cook, May 28, 1780,	14 56	347 30	6 56
Eekberg, in April, 1775,	15 35	353 30	9 52
Cook, May 27, 1780,	15 54	348 26	8 28
Sept. 13, 1776,	16 00	325 55	4 21
	16 04	325 54	3 58
Eekberg, in Jan. 1774,	16 08	355 35	4 19
In March,	16 33	338 39	4 26
Bayly, May 26, 1780,	16 40	349 32	6 45
Cook, Sept. 14, 1776,	17 22	325 10	6 27
Bayly, May 25, 1780,	17 52	350 36	12 43
Cook,	18 12	351 23	13 37
Eekberg, in March, 1774,	18 17	339 01	8 27
Le Gentil, in 1771,	18 39	2 26	20 30
Bayly, Sept. 29, 1776,	18 45	336 30	9 38
Eekberg, in March, 1774,	19 36	340 07	10 37
	20 08	340 25	11 37
	20 30	340 27	14 15
Bayly, Oct. 1, 1776,	20 49	335 50	12 02
Le Gentil, in 1771,	21 08	4 22	23 00
Eekberg, in March, 1774,	21 15	340 55	16 30
Cook, Sept. 17, 1776,	21 57	324 30	15 18
In March, 1774,	22 11	342 05	17 52
May 22, 1776,	22 16	356 13	22 45

Eekberg,

By whom observed in 1771, *to* 1780.	Lat. S.	Long. E.	Dip. S. end
	° ′	° ′	° ′
Eekberg, in Jan. 1775,	22 18	1 54	24 30
Le Gentil, in 1771,	22 40	6 05	27 30
	23 08	6 37	27 30
Bayly, May 20, 1780,	23 34	358 14	24 47
Eekberg, in April, 1774,	23 35	343 52	21 10
Cook, May 20, 1780,	24 35	0 30	28 15
Bayly, Oct. 5, 1776,	24 40	336 39	19 42
Eekberg, in April, 1774,	25 03	343 50	22 25
Cook, Sept. 19, 1775,	25 37	325 30	21 23
Eekberg, in April, 1774,	25 41	344 06	23 30
	26 13	344 56	25 00
Bayly, May 18, 1780,	26 25	4 00	32 42
Eekberg, in Jan. 1775,	26 37	6 20	31 26
Cook, Sept. 20, 1776,	27 01	326 35	23 36
Eekberg, in April, 1774,	27 10	346 40	26 00
	27 12	348 02	26 45
Cook, May 17, 1780,	27 36	6 18	34 22
Sept. 21,	27 52	327 55	25 26
	27 58	328 15	26 49
Eekberg, in April, 1774,	28 46	350 02	27 30
Bayly, Oct. 8, 1776,	28 47	339 40	27 51
Bayly, May 15, 1780,	29 53	11 05	40 53
Cook,	29 54	11 10	39 05
Sept. 24, 1776,	30 16	332 28	29 02
Eekberg, in April, 1774,	30 18	10 17	40 45
	30 20	353 54	29 37
Bayly, Oct. 14, 1776,	30 24	343 02	31 51
Eekberg, in April, 1774,	31 36	357 04	32 45
	32 23	359 38	35 15
Cook, May 13, 1780,	32 32	16 26	44 20
Eekberg, in April, 1774,	32 51	13 57	42 00
	33 07	2 55	37 32
	33 07	1 58	37 15
	33 36	3 28	37 52

Bayly,

By whom observed in 1771, *to* 1780.	Lat. S.	Long. E.	Dip. S. end
	° ′	° ′	° ′
Bayly, Oct. 21, 1776,	33 40	2 02	39 04
Oct. 19,	33 41	357 50	37 16
Cook, Sept. 29, 1776,	33 47	343 49	34 22
Bayly, Oct. 26,	34 05	9 20	41 26
	34 05	18 20	44 48
Eekberg, in April, 1774,	34 08	18 42	44 27
	34 09	6 04	39 00
Bayly, April 21, 1780, at Table Bay, at the Cape of Good Hope, - -	34 11	18 51	46 46
Eekberg, in April, 1774,	34 12	18 45	44 07
	34 12	19 40	44 15
	34 16	6 27	39 50
Cook, Oct. 3, 1776,	34 32	351 20	36 13
Eekberg, in April, 1774,	34 35	17 39	43 30
	34 36	15 45	42 30
	34 36	13 27	41 30
	34 49	11 57	41 00
	34 52	9 20	40 22
Cook, Oct. 7, 1776,	35 17	152 24	38 07
Oct. 8,	35 31	152 55	38 49
Oct. 10,	35 47	358 05	40 30

TABLES

TABLES OF THE DIP OF THE MAGNETIC NEEDLE,

Observed at different Times in the Indian Ocean, North of the Equator.

Longitude from the Meridian of London.

By whom observed in 1768, *to* 1780.	Lat. N.	Long. E.	Dip. S. end
	° ′	° ′	° ′
Le Gentil, in 1776, at Manile, a-breaſt of the Iſland in the Sound - -	0 44		16 30
In 1770,	1 00	89 24	15 45
Bayly, Feb. 1,	1 20	106 00	13 16
Cook, Feb. 1, 1780,	1 20	105 30	12 51
Le Gentil, in 1770,	1 50	89 23	14 18
In 1768, 20 Leagues off the firſt Iſland, and 12 Leagues off Sumatra, - -	2 12		10 59
Six Leagues off the firſt Iſl. and 20 from Sumatra	2 12		11 07
In the Road of Malaca, in 1770, - -	2 12		12 20
	2 24	88 12	12 22
Cook, Jan. 3, 1780,	3 18	104 46	19 02
Le Gentil, in 1770,	3 24	88 47	11 41
Eekberg, in July, 1774,	3 30	104 37	10 03

In

By whom observed in 1768, to 1780.	Lat. N.	Long. E.	Dip. S. end
	° ′	° ′	° ′
In 1768, at 15 Leagues off the first Island, and 25 from Sumatra, -	3 48		9 31
At 15 Leagues off the first Island, and 30 from Sumatra, - -	4 02		8 43
In 1768, at 15 Leagues off the first Isle of Malaca, and near 100 Toises off Pol-aor	4 06		12 00
At 3 Leagues from the first Isle, and 15 from Sumatra,	4 06		13 05
In the Straights, 2 Leagues from Mount Formose, and 15 off Sumatra, -	4 06		13 07
In 1770,	4 28	88 22	9 37
Bayly, Jan. 30, 1780,	4 47	105 25	7 03
Le Gentil, in 1768, at 7 Leag. off the first Island of Malaca, 40 from Sumatra, and 15 from Pol-Pinany, -	4 55		7 26
At ½ League from Pol-Pinany, and 40 Leagues from Sumatra, - -	5 25		6 22
In 1770,	6 08	87 52	6 37
Le Gentil, in 1768, 20 Leag. from Sumatra, -	9 09		4 56
At 40 Leagues from the first Island, and 40 off the Point of Achem, -	6 31		2 22
Cook, Jan. 29, 1780,	6 53	105 49	1 39
Bayly,	7 15	106 30	1 33
Le Gentil, round Manila, and the Island in the Sound,	7 22		0 52

By whom observed in 1768, *to* 1780.	Lat. N.	Long. E.	Dip. S. end
	° ′	° ′	° ′
In 1768, at 50 Leagues from the firſt Iſland, and 40 from the Point Achem,	7 31		2 52
Eekberg, in July, 1774,	7 42	107 42	2 15
Le Gentil, in 1768, without the Straights of Malaca, at the Iſles of Necobar, and 30 Leagues from the firſt of the Malaca Iſlands, 50 from Sumatra, and 250 from the Iſles l'Inde, -	7 45		2 41
In 1770,	8 08	87 22	2 52
In 1766,	8 22		1 30
Cook, in 1780, in the Harbour of Pulo Candor, -	8 39	106 49	1 55
Bayly, Jan. 27,	8 40	107 14	2 01
Jan. 20,	8 45	107 50	2 11
Cook, Jan. 20,	8 46	108 15	2 00
Eekberg, in July, 1774,	9 24	108 42	0 05
Le Gentil, in 1770, on Board the Daphin, -	9 38	86 25	1 37
Eekberg, in July, 1774,	10 00	109 18	0 52
Le Gentil, in 1768, at 15 or 20 Leagues off Ceylon, and about 30 from Tanjarur,	10 07	*Dip changed.* 81 30	N. end 0 44
Le Gentil, in 1770,	10 40	85 51	3 37
Eekberg, in July, 1774,	11 27	110 17	4 37
Le Gentil, in 1770,	12 03	85 14	5 35
Bayly, Jan. 17, 1780,	12 54	112 30	13 11
Le Gentil, in 1770,	13 39	84 56	8 52
Eekberg, in July, 1774,	14 01	112 17	9 15
Cook, Jan. 15, 1780,	18 58	114 11	21 32
Bayly, Nov. 27, 1779,	20 35	116 17	23 38
Cook, Nov. 20,	22 07	130 17	25 56

Bayly,

By whom observed in 1768, *to* 1780.	Lat. N.	Long. E.	Dip. N.end
	°	° ′	° ′
Bayly, Dec. 13, 1779,	22 09	114 06	27 01
Eekberg, in Aug. 1774,	23 30	112 57	36 10
Cook, Nov. 16, 1779,	25 05	149 13	30 48

TABLES OF THE DIP OF THE MAGNETIC NEEDLE,

Observed at different Times in the Indian Ocean, South of the Equator.

Longitude from the Meridian of London.

By whom observed in 1770, *to* 1780.	Lat. S.	Long. E.	Dip. S. end.
	° ′	° ′	° ′
Le Gentil, in 1770,	0 06	89 26	17 52
Cook, Feb. 2, 1780,	0 22	105 24	15 22
Le Gentil, in 1770,	1 14	89 52	19 26
In 1776, without the Straig. of Banca, about 9 Leagues off Manopin, and about 8 from Sumatra, -	1 38		17 45
In 1771,	1 49	86 14	26 30
In 1776, about 4 Leagues from Manopin, and $2\frac{1}{2}$ Leagues from Sumatra,	2 06		19 00
Eekberg, in July, 1774,	2 20	105 03	21 37
Le Gentil, about 2 Leagues off Sumatra, - -	2 21		19 22
In 1776, about 2 or 3 Leagues from the neareſt Point of Banca, -	2 43		20 22
In 1770,	2 47	90 31	22 30

In

By whom observed in 1770, *to* 1780.	Lat. S.	Long. E.	Dip. S. end.
	° ′	° ′	° ′
In 1776, about 7 Leagues from Sumatra, -	3 08		21 15
In the Straights of Banca, ½ a League from Sumatra,	3 09		20 22
Bayly, Feb. 6, 1780,	3 15	106 40	22 36
Le Gentil, in 1770,	3 55	90 59	23 52
	4 24	91 03	24 48
	4 25	91 06	25 22
	4 26	91 08	25 22
	4 30	90 59	26 26
Cook, Feb. 6, 1780,	4 36	104 32	24 22
Le Gentil, in 1770,	4 52	91 28	26 00
In 1776, 6 Leagues from Sumatra, and 15 from Java,	5 02		24 30
In 1776,	5 07	91 13	26 52
About 6 Leagues from Point Nicolas, and 3¾ from Sumatra, - -	5 33		25 07
In 1770,	5 38	90 52	27 41
Eekberg, in Jan. 1775,	5 45	104 52	26 49
Le Gentil, about 2½ Leag. off St. Nicolas, -	5 46		26 00
Eekberg, in July, 1774,	5 59	104 03	26 56
Bayly, Feb. 12, 1780,	6 05	107 06	26 02
Le Gentil, about 2 Leagues from Java, - -	6 13		26 22
Eekberg, in Jan. 1775,	6 28	103 57	28 00
In July, 1774,	6 30	103 52	28 00
Le Gentil, in 1776, about ¾ of a League from the nearest Point of Java, -	6 31		26 45
Eekberg, in Jan. 1775,	6 42	104 48	31 45
Le Gentil, in 1770,	6 47	90 13	29 22
In 1776,	6 58	91 00	27 52

Le

By whom observed in 1770, *to* 1780.	Lat. S.	Long. E.	Dip. S. end
	° ′	° ′	° ′
Le Gentil, in 1770,	7 35	89 32	31 15
Eekberg, in July, 1774,	7 37	104 25	28 30
In July,	7 59	105 24	29 26
Le Gentil, in 1770,	8 01	89 05	31 52
Bayly, Feb. 19, 1780,	8 17	105 50	30 23
Eekberg, in 1774,	8 27	105 27	29 57
	8 41	108 01	30 37
	8 49	110 58	30 56
Le Gentil, in 1770,	8 52	87 59	33 56
Eekberg, in June, 1774,	9 23	108 28	32 52
In Jan. 1775,	9 24	102 27	32 52
Le Gentil, in 1770,	10 07	86 41	35 45
Eekberg, in Jan. 1775,	11 00	102 04	34 37
Le Gentil, in 1770,	11 42	84 57	39 18
Eekberg, in June, 1774,	11 56	107 08	36 00
Le Gentil, in 1770,	13 19	83 15	42 07
Cook, Feb. 23, 1780,	13 35	103 53	35 00
Eekberg, in Jan. 1775,	14 06	100 17	39 15
Le Gentil, in 1770,	14 13	81 47	44 03
Eekberg, in 1774,	14 53	107 18	38 56
Le Gentil, in 1770,	15 00	80 36	45 07
	15 58	79 13	47 07
Cook, March 1, 1780,	16 51	92 07	45 04
Eekberg, in June, 1774,	17 06	106 25	42 07
Le Gentil, in 1770,	17 15	77 39	49 30
Eekberg, in Jan. 1775,	17 19	96 09	41 30
Bayly, March 2, 1780,	17 56	87 50	47 57
Le Gentil, in 1770,	18 20	75 47	50 27
Cook, March 4, 1780,	18 29	89 25	47 22
Le Gentil, in 1770,	19 14	73 13	51 30
	19 28	70 22	52 03
	19 45	64 16	53 35
Eekberg, in June, 1774,	19 47	105 25	44 52
Bayly, March 8, 1780,	20 04	77 40	52 16

Cook,

By whom observed in 1770, *to* 1780.	Lat. S.	Long. E.	Dip. S.end.
	°	° ′	° ′
Cook, March 29, 1780,	20 33	75 30	52 07
Eekberg, in Jan. 1770,	20 34	90 37	46 03
Bayly, March 11, 1780,	20 54	72 06	54 36
Eekberg, in June, 1774,	21 42	105 44	47 52
In Jan. 1775,	22 23	85 36	50 41
Cook, March 15, 1780,	22 37	63 33	55 52
Eekberg, in June, 1774,	23 12	104 17	52 52
Bayly, March 16, 1780,	23 13	60 47	56 48
Eekberg, in Jan. 1775,	24 17	74 47	54 52
Cook, March 18, 1780,	25 08	59 03	57 29
Eekberg, in June, 1774,	25 37	100 34	54 30
In Jan. 1775,	26 02	66 17	57 45
Bayly, March 20, 1780,	26 36	55 00	58 30
March 25,	26 36	55 00	55 58
Eekberg, in Jan. 1775,	27 24	59 42	59 45
	28 58	50 57	53 30
Cook, March 24, 1780,	29 06	43 23	56 15
Eekberg, in June, 1774,	29 37	97 38	56 00
In Jan. 1775,	30 48	45 02	57 34
Bayly, March 30, 1780,	31 03	33 55	53 07
Cook, March 27,	31 03	37 54	54 17
April 1,	32 11	31 11	50 27
Eekberg, in 1775,	32 24	39 39	55 00
In June, 1774,	32 45	91 12	57 52
In Jan. 1775,	34 29	28 03	48 22
	34 39	29 35	49 52
In June, 1774,	34 39	88 58	59 12
	34 39	78 56	61 37
Bayly, April 3, 1780,	35 00	24 11	51 16
Eekberg, in Jan. 1775,	35 00	29 31	52 11
In June, 1774,	35 13	74 41	61 48
In Jan. 1775,	35 15	25 06	46 56
	35 16	23 35	45 15
Cook, April 4, 1780,	35 23	23 25	49 37

Eekberg,

By whom observed in 1770, *to* 1780.	Lat. S.	Long. E.	Dip. S. end.
	° ′	° ′	° ′
Eekberg, in June, 1774,	35 25	84 30	60 33
	35 30	72 27	62 30
In Jan. 1775,	35 48	24 36	46 52
Bayly, April 6, 1780,	35 48	22 10	50 07
Cook,	35 49	22 03	45 37
Eekberg, in May, 1774,	36 22	48 06	61 26
	36 39	42 37	56 11
	36 44	42 06	59 22
	36 44	33 09	54 00
	36 45	56 15	62 49
	36 52	66 47	62 30
	36 54	26 03	50 30
	37 04	28 19	52 30
Bayly, Dec. 5, 1776,	38 54	24 00	51 33
Cook, Dec. 6,	39 00	24 02	49 30
Bayly, Jan. 16,	44 17	128 25	71 34
Cook, Jan. 14,	47 19	115 42	73 21
Bayly, Dec. 13, 1776,	47 40	44 10	61 14
Dec. 19,	47 40	55 50	66 34
Jan. 13, 1777,	47 50	114 20	73 10
	47 50	114 20	73 22
Cook, Jan. 7, 1777,	48 10	95 39	69 54
Bayly, Jan. 11,	48 15	109 46	72 27
Jan. 3,	48 17	84 50	69 20
Cook, Jan. 3,	48 17	84 30	68 59
Bayly, Dec. 21,	48 17	64 10	68 38
Jan. 8,	48 20	102 20	71 18
Dec. 17, 1776,	48 24	55 50	65 36
Cook, Dec. 17,	48 24	55 50	65 44
Dec. 27,	48 41	69 40	67 47
Bayly, Dec. 27,	48 41	69 30	68 14
	48 41	69 30	68 26

TABLES OF THE DIP

OF THE

MAGNETIC NEEDLE,

Observed at different Times in the Pacific Ocean, North of the Equator.

Longitude from the Meridian of London.

By whom observed in 1776, *to* 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Cook, Dec. 23, 1777,	0 44	203 05	8 42
Bayly, Dec. 25,	1 57	203 00	11 29
Cook, Dec. 22,	1 58	203 00	11 54
Dec. 24,	2 02	202 56	10 53
Jan. 4, 1778,	4 08	203 16	16 16
Bayly,	4 50	202 55	15 40
Cook, Jan. 8,	7 45	205 18	23 01
Jan. 9,	8 12	205 34	23 37
Bayly, Jan. 10,	10 31	205 00	26 49
Cook, Jan. 12,	12 17	204 36	29 54
Sept. 17, 1776,	12 40	201 54	37 38
Jan. 12, 1779,	18 35	204 51	38 30
Bayly, Jan. 15, 1778,	19 00	201 10	39 49
Cook, in the Bay of the Island Oeyhea - -	19 28	204 00	40 32
Feb. 3, 1779,	19 28	204 00	41 14
March 26,	19 48	183 39	37 00
March 25,	19 57	184 42	38 52

By whom observed in 1776, *to* 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Bayly, March 25, 1779,	19 59	104 35	38 47
Cook, March 21,	20 37	192 43	41 25
Bayly, March 19,	21 12	194 40	42 10
Cook, Jan. 18, 1778,	21 17	201 18	42 10
Jan. 28,	21 21	200 30	42 23
Bayly, Jan. 18,	21 46	201 00	42 36
Jan. 31,	21 47	200 25	42 36
Cook, March 6, 1779,	21 56	216 46	43 11
April 2,	22 36	177 50	38 00
Bayly, Feb. 13, 1778,	24 30	199 44	45 43
Cook, Feb. 4,	24 31	200 00	45 52
Nov. 14, 1779,	24 36	142 30	29 31
April 3,	24 38	175 51	38 52
Bayly, Nov. 14,	24 50	141 20	31 58
Nov. 13,	25 56	143 46	31 27
April 5,	25 57	174 17	43 10
Cook, Feb. 6, 1778,	27 41	201 00	49 42
Bayly, Feb. 5,	27 43	200 30	48 51
Cook, Feb. 8, 1778,	30 18	201 37	51 25
April 8, 1779,	30 39	167 34	42 55
Bayly,	30 54	167 02	43 35
Feb. 9, 1778,	31 16	203 18	53 47
Feb. 14,	31 34	306 17	53 10
April 9, 1779,	32 16	167 09	43 47
Feb. 14, 1778,	31 35	206 43	52 12
Nov. 17,	32 26	207 30	54 54
April 10, 1779,	33 30	166 30	45 37
Bayly, Nov. 15, 1778,	33 34	107 32	56 03
Cook, Nov. 7, 1779,	33 52	148 35	42 50
Bayly, Feb. 17, 1778,	35 04	206 30	56 53
Nov. 1, 1779,	35 09	142 16	46 35
Cook, Oct. 31,	35 30	142 20	45 00
Aug. 30,	36 41	142 26	46 26
Feb. 18, 1778,	36 53	206 32	55 19

Cook,

By whom observed in 1776, *to* 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Cook, Nov. 28, 1779,	38 06	142 30	48 10
Bayly, Feb. 20, 1778,	38 10	208 15	59 32
Cook, Feb. 21,	39 06	210 15	59 15
Bayly, Oct. 26, 1779,	40 04	142 44	51 34
Cook, Oct. 22,	40 50	148 47	51 53
Feb. 22, 1778,	41 00	215 40	62 54
Cook, Nov. 9, 1779,	41 40	147 03	40 03
Bayly, April 15,	41 53	160 10	53 58
Cook, April 16,	42 12	160 11	53 34
April 17,	43 18	158 67	54 15
Bayly, Feb. 26, 1778,	43 20	222 30	65 48
March 6,	44 30	235 50	68 29
Cook, March 1,	44 49	228 29	67 25
Bayly,	44 51	229 20	68 31
Cook, March 16,	44 56	234 56	68 19
March 19,	44 57	234 10	67 20
Bayly, Oct. 16, 1779,	45 08	154 10	57 28
Cook, Oct. 15,	46 30	156 01	57 10
Bayly, March 24, 1778,	47 44	235 00	70 00
Cook, Oct. 14, 1779,	48 17	156 15	59 20
Bayly, March 28, 1778,	49 27	233 50	71 53
Cook, April 5, 1778,	49 36	233 47	72 35
Bayly, April 20, 1779,	49 47	161 23	60 55
Oct. 12,	50 55	157 42	63 38
April 27,	52 22	159 23	64 57
Cook, Sept. 15,	53 00	159 14	63 01
June 7,	53 00	159 14	63 08
Bayly, Aug. 17,	53 50	168 41	66 03
Oct. 3,	53 54	194 00	69 11
Cook, June 30,	53 54	194 00	68 20
Oct. 12, 1778,	53 55	196 00	69 23
Bayly, May 1,	54 40	225 00	73 34
Aug. 12, 1779,	55 24	171 30	67 47
Cook, June 18, 1778,	55 24	201 20	70 57

By whom observed in 1776, *to* 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Cook, June 21, 1779,	55 51	164 21	65 31
Bayly, June 21,	56 02	164 40	66 40
July 5, 1778,	56 3.	199 30	71 01
June 10,	57 10	207 55	73 49
Cook, July 14, 1780,	58 12	199 15	72 22
Bayly, July 13, 1778,	58 12	198 48	73 06
Cook, May 14, 1780,	58 22	221 22	75 26
Bayly, Sept. 27,	58 38	189 08	73 34
May 5, 1778,	58 47	221 33	76 26
Cook, June 25, 1779,	59 07	169 17	68 25
Aug. 7,	59 33	183 20	71 25
Bayly, July 19, 1778,	59 37	197 45	73 03
June 27, 1779,	59 56	176 00	70 26
Cook, May 17, 1778,	60 50	213 26	78 32
Bayly,	60 51	213 08	77 07
May 31,	61 12	209 10	76 09
Cook, June 30, 1779,	61 48	181 00	71 57
Bayly, July 1,	61 52	182 10	72 18
Cook, July 3,	63 36	187 01	74 12
Bayly,	63 42	188 00	74 59
Cook, Aug. 2,	64 03	189 20	76 07
Bayly, Sept. 7, 1778,	64 20	195 40	76 36
Sept. 13,	64 21	198 30	76 58
Cook, Aug. 1, 1779,	64 23	189 32	76 03
Sept. 13, 1778,	64 33	197 50	76 25
Bayly, Aug. 5,	64 35	192 54	76 40
July 31, 1779,	65 09	189 57	76 17
Aug. 11, 1778,	66 30	191 13	77 10
Sept. 2,	66 30	189 30	77 15
Cook, Aug. 13,	66 32	192 27	77 07
July 28, 1779,	67 08	189 49	78 48
Bayly, July 27,	67 30	189 07	78 15
Cook, July 10,	68 01	188 45	78 30
July 9,	69 12	188 35	79 00

Bayly,

By whom observed in 1776, to 1780.	Lat. N.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Bayly, July 8,	69 23	194 30	80 03
July 13,	69 26	188 48	80 05
Cook, Aug. 26, 1778,	69 36	185 44	79 35
July 14,	69 36	188 45	79 00
Bayly, Aug. 26,	69 37	182 40	79 04
July 17, 1779,	69 56	195 45	79 52
Cook, Aug. 19,	70 06	197 06	79 40
July 18,	70 26	196 22	79 58
Bayly, Aug. 18,	70 30	198 15	81 46

TABLES

TABLES OF THE DIP OF THE MAGNETIC NEEDLE,

Observed at different Times in the Pacific Ocean, South of the Equator.

Longitude from the Meridian of London.

By whom observed in 1773, *to* 1777.	Lat. S.	Long. E.	Dip. N. end
	° ′	° ′	° ′
Bayly, Dec. 22, 1777,	0 20	204 00	6 00
Cook,	0 34	203 28	5 57
Bayly, Dec. 21, 1777,	1 50	203 20	3 04
Dec. 20,	2 02	203 40	2 54
Cook,	3 13	203 55	0 12
Bayly,	3 16	204 06	0 09
In about the Lat. of 3° 20′ S. and Long. of about 204° E. it appears that the Dip changes from the N. end of the Magnetic Needle to the S. end.			Dip. S. end
Cook, Dec. 20, 1777,	3 32	204 00	0 55
Bayly, Dec. 19,	3 40	204 10	0 48
	3 41	204 10	0 56
Cook, Dec. 20,	3 50	204 00	1 02
Dec. 19,	4 36	204 30	3 16
Dec. 19,	4 56	204 42	3 11

Bayly,

By whom observed in 1773, *to* 1777.	Lat. S.	Long. E.	Dip. S. end.
	° ′	° ′	° ′
Bayly, Dec. 18, 1777,	6 10	204 54	6 56
Cook,	6 23	204 40	7 15
Bayly, Dec. 17,	7 24	204 10	9 09
Cook,	7 38	204 49	10 12
Dec. 16,	8 56	204 50	13 12
Dec. 15,	9 48	205 50	14 58
Dec. 14,	11 03	206 00	16 23
Bayly, Dec. 9,	14 36	208 06	24 00
Cook, Oct. 25, 1777, upon the Coaſt of the Iſland of Huaheine - - -	16 44	205 04	28 19
Sept. 9,	16 44	209 22	29 21
Nov. 10,	16 45	208 55	29 15
Sept. 8, upon the Shore of Otaheite, - -	17 29	210 40	29 03
Bayly, April 16, 1777,	18 06	196 40	32 16
	18 08	196 33	32 16
April 5,	19 14	200 34	32 52
Cook, Sept 19,	19 46	186 08	36 55
April 1,	19 51	202 06	34 35
Bayly, June 7,	20 14	185 30	38 15
	20 14	185 30	38 41
Cook, June 22,	21 08	185 25	39 01
Bayly, March 30,	21 53	202 30	36 50
March 27,	23 16	201 53	40 10
Aug. 8,	23 55	211 26	38 57
March 21,	26 50	202 00	44 48
Cook, Aug. 5,	26 50	206 45	43 50
March 22, 1776,	26 52	202 10	44 41
Aug. 3, 1777,	27 43	204 24	45 37
March 20,	29 04	201 49	47 21
Bayly, March 15,	33 40	199 10	53 41
Cook, March 12,	38 41	196 51	59 03
Bayly, March 10,	39 23	195 45	59 38

Cook,

By whom observed in 1773, *to* 1777.	Lat. S.	Long. E.	Dip. S. end
	° ′	° ′	° ′
Cook, March 10, 1777,	39 26	196 09	60 09
Bayly, Feb. 9,	40 33	171 50	64 56
Cook, Feb. 19, 1776, at New Zealand - - -	41 05	174 40	62 49
Bayly, Feb. 19, 1777,	41 05	174 35	64 39
Cook, at New Zealand, three different Times, -	41 05	174 55	64 36
Bayly, March 3,	42 00	183 30	64 22
Jan. 22,	43 17	147 50	71 00
Jan. 27,	43 21	148 03	70 55
Jan. 29,	43 21	148 03	71 00
Cook, Jan. 28,	43 22	147 58	70 15
Feb. 5,	43 31	162 20	68 52
Bayly, Feb. 4,	43 40	160 00	69 46
Cook, in May, 1773, at New Zealand, - -	45 47	166 48	70 05

APPENDIX.

APPENDIX.

HAVING in *Caſe* I. treated at ſome length upon what I conceive magnetiſm to be, and taken ſome notice of it's effect upon iron, it will only be neceſſary in this place to point out ſome uſeful hints to the ſhip-builder and navigator, with reſpect to the ſituation of the compaſs on board of ſhips, many of which are ſo conſtructed, that there is a neceſſity for the binacle being placed cloſe to the commings of the after hatchway; where this is unavoidable, the bolts ought to be made of copper, becauſe the iron bolts affect the needle of the compaſs, as has already been taken notice of.

It has already been obſerved, that in all latitudes, at any diſtance from the magnetic equator, the upper end of all iron bolts, &c. become poſſeſſed of a polarity of a different name with the latitude; that is, in north latitude the upper end of a bolt, or bar of iron, becomes poſſeſſed of ſouth polarity, and in ſouth latitude of north polarity. Therefore, let us ſuppoſe in any north latitude, where the dip of the needle is more than 45 degrees, that a ſhip be ſailing E. N. E. by the compaſs, upon a wind with the larboard tacks on board: if the upper end of a perpendicular iron bolt be in a line right before the compaſs, and

within the diſtance of 18 inches, it will attract the north end of the needle more or leſs, according to the diſtance; ſo that although the ſhip's courſe appears to be E. N. E. by the compaſs, the real magnetic courſe may be only E. N. E. ½ E. As ſhips in general, when cloſe-hauled, lie within or about ſix points from the wind; therefore, the ſhip, when put about from the apparent courſe of E. N. E. ought to lie up only W. N. W. upon the ſtarboard tack. But as the bolt had attracted the north end of the needle half a point from the magnetic meridian, when the ſhip's head was to the eaſtward, it will do the ſame when ſhe is upon the ſtarboard tack with her head to the weſtward, which will make an error of a point, and the ſhip will lie up N. W. by W. ſo that the navigator is induced to believe that the wind has changed a point, or that his ſhip lies cloſer to the wind than uſual. But if the caſe be reverſed, with the wind from the ſouth, and the ſame ſhip upon a wind with the ſtarboard tacks on board, the bolts will then repel the ſouth end of the needle, (ſay half a point) and the ſhip's courſe will appear to be E. S. E. ½ E. by the compaſs in place of E. S. E.

As the ſhip's courſe by the compaſs was E. S. E. ½ E. when upon the ſtarboard tack, it ought to be S. W. by W. ½ W. when upon the larboard tack; but the poſition of the bolt being changed to the weſt of the needle, it will repel the ſouth end of it half a point to the eaſt of the magnetic meridian, and the ſhip's courſe will appear to be only W. S.

W. S. W. ½ W. This phenomenon has in general led navigators to believe, that the wind had headed them in the time that their ſhip was putting about.*

Unarmed veſſels have a very great advantage over ſhips of war, &c. in being able to ſteer a true courſe, becauſe they are under no neceſſity whatever of having any iron near to their compaſſes. However, their binacles ought to be ſo conſtructed, that their compaſſes may be at leaſt two feet from the deck, which would prevent the nails having any effect upon the needle.

But on board of ſhips of war, and all armed veſſels, where there are great quantities of iron, it is hardly poſſible to account for all the different derangements of the magnetic polarity; for it will be as variable as the different poſitions that a ſhip may be in, and in every part of the ſhip the compaſs will have a different variation from the true meridian.—See Mr. Downie's Report.

It appears, therefore, evidently neceſſary, as often as the ſhip's courſe is changed, when ſhe is either going by or large, that the variation ought to be obſerved, and that all the obſervations ought to be made upon the top of the binacle, or as near to it as poſſible; for if the variation is obſerved at any part of the ſhip, where the meridional or azimuth compaſs does not agree with the compaſs in the binacle, the obſervation will be of no uſe, becauſe it is the variation of the com-

* Admiral Murray, and ſome others, are exceptions.—See *Caſe* I. which this article relates to.

paſs that the ſhip is ſteered by, that is wanted; and it matters not what the quantity of the variation is, provided it can be aſcertained with accuracy, ſo that it may be accounted for.

Caſe II. being intirely a matter of conjecture, and as it does not at preſent appear that any thing that can be ſaid further upon it will be of any utility, I will therefore paſs it over without any farther notice, and proceed to make ſome obſervations upon *Caſe* III.

Caſe III. It has been attempted to account for the cauſe of the magnetic poles changing their places, and alſo to prove that their change of longitude is from the eaſt towards the weſt. If the magnetic poles changed their places from the weſt towards the eaſt, it would be evident that that power or quality, called magnetiſm, would in itſelf be poſſeſſed of a rotative quality, as well as of north and ſouth polarity. But as we have nothing to found that opinion upon, but the one ſingle inſtance, viz. that the line of no variation appears to have been at London before it was at Paris, which is inconteſtibly impoſſible, becauſe we find that in the year 1600 the line of no variation (with eaſt variation on the weſt ſide of it, and weſt variation on the eaſt ſide of it) was at Cape Anguillas, and in the year 1638 at Conſtantinople, ſtretching towards the north-weſt, and paſſing through Vienna in Auſtria; at theſe places the variation was eaſterly until that period, and all

over

over the weſt parts of Africa and Europe the variation was eaſt at that time.*

In the year 1657, Mr. Bond obſerved that the magnetic and true meridian coincided at London. It is therefore very obvious, that the line of no variation could not have advanced weſtward from Vienna in Auſtria to London, without being firſt at Paris; although, by ſome obſervations which we have on record, it was not at Paris until the year 1663; and by others, not until 1666. One thing is certain, namely, that there has not been any line of no variation in Europe to the eaſtward of Paris ſince that time, which would have been the caſe, if the progreſſion or change of the places of the magnetic poles, with their lines of no variation, had been from the weſt towards the eaſt. It is alſo certain, that the line of no variation, which was at London and Paris in the years 1657 and 1663, was not the line of no variation which is now to the weſtward of Van Dieman's Land, and ſtretching northward by Timor and China; becauſe that line has eaſt variation on the eaſt ſide of it, and weſt variation on the weſt. The above, and what is ſaid in *Caſe* III. are the reaſons upon which I have founded my opinion, that the magnetic poles change their places from eaſt to weſt.

Caſe IV. relates principally to the courſe or direction of the magnetic current of polarity in the different parts of the world, by which it affects and

* Muſchenbroeck, page 166; and table vii.

and directs the needle of the compaſs. It was obſerved, that all high promontories, or headlands, that jut far out into the deep ocean, ſuch as Van Dieman's Land, Cape of Good Hope, and Cape Horn, would have a ſuperior magnetic power to the ſeas that are at ſome diſtance from them, which is occaſioned by their elevation in the atmoſphere, and having in their compoſition a greater quantity of ferruginous matter than the ſeas, of courſe their magnetic attraction and repulſion is more powerful, and deranges the general current of magnetic polarity, which appears to be very conſpicuous on the eaſt and weſt of South America. At this time the Atlantic line of no variation ought to be conſiderably to the weſtward of what it is in the ſouthern hemiſphere, and there ought to be weſt variation as far to the ſouth and weſt, as Buenos Ayres, in the mouth of the river De la Plata. But by the ſuperiority of the magnetic power that the land is poſſeſſed of in proportion to the ſea, the ſouth end of the needle is attracted by it; ſo that there is eaſt variation all over the eaſt coaſt of South America, and the line of no variation is repelled to the eaſtward of it's proper place in a very oblique direction. On the weſt ſide of this great peninſula, the eaſt variation is not ſo great as it ought to be, for the above reaſons.

If *plate* 2 be drawn upon a larger ſcale than what it is in this treatiſe, ſay each hemiſphere 12 inches diameter, and cut out ſeparate from each other, and made moveable upon their centers, with

with their equatorial lines touching each other, ſo that the true meridian lines for any longitude of both hemiſpheres may be brought to coincide in a ſtrait line, the variation may be calculated by them for any other latitude and longitude, (the ſame as for London) with tolerable exactneſs all over the globe, except near to South America. The ſmall figures at the interſection of the lines in *plate* 2, ſhew the angle and the latitude at which the magnetic meridians cut the true meridians in the different longitudes.

If the different meridians of longitude be brought to coincide with each other in a ſtrait line, the relative ſituations of the magnetic poles at each of them, with reſpect to their bearings with the true meridians, will explain the whole phenomenon of the variation increaſing and decreaſing more in one number of degrees of longitude, than in another number of the ſame quantity; and the reaſon of the variation being greateſt, and changing leſs in a degree of longitude at half, or at longitudes at equal diſtances from the magnetic poles; and alſo why it changes more in a degree at and near the lines of no variation, than at any other longitude.

The dip of the magnetic needle, which is partly the ſubject of *Caſe* V. being ſo far explained, and ſo eaſy to be underſtood, it does not appear neceſſary to ſay any thing more upon it at this time; but only to ſuggeſt, that if Government, or the Board of Longitude, ſaw that it would be of utility and advantage in navigation, as well as

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to ſatisfy the curioſity of the philoſopher; or may I be permitted to conceive, after what I have ſaid upon it, that for their own ſatisfaction, as well as to inveſtigate the matter more fully, they will as ſoon as they poſſibly can, with a convenient connection with any other voyage that may be made for the improvement of navigation, give ſuch inſtructions to the commander of ſuch voyage, that the dip, or inclination of the magnetic needle, may be taken with accuracy in ſome particular longitudes, ſuppoſe in the longitudes of 20°, 100°, and 200° weſt; it is evident that the dip might be projected upon a chart, ſuch as is repreſented by *plate* 3, (but upon a large ſcale) for the whole globe with very great exactneſs; the uſe of which, with reſpect to finding the longitude, &c. has already been pointed out. The center of the magnetic poles would alſo be aſcertained.

The new tables of variation are calculated upon the principles, and in the ſame manner as the variation for London is calculated. See *Caſe* IV. *page* 37, and *plate* ii.

It only remains to point out that they may be of uſe to the community in general, but more particularly to thoſe who are concerned in navigation; becauſe the navigator, in dark weather, when he has no opportunity of taking either an azimuth or an amplitude, can by theſe Tables find the variation of any latitude and longitude in the northern Atlantic ocean, and by them he can clearly perceive whether he ought to allow for the variation increaſing

increaſing or decreaſing, according to the courſe he is ſteering: this is a matter of very great conſequence, particularly near the lines of no variation, where the variation changes very much in a ſhort diſtance: to illuſtrate which, ſuppoſe a ſhip or fleet ſails from the ſouth ſide of Jamaica, and takes it's departure for the leeward paſſage from Bluefields, or Savana la Mar, which is in the latitude of 18° 10′ S. and longitude of 78° 34′ W. As the iſland of Grand Coymanas (which is in the latitude of 19° 45′ N. and longitude of 81° 35′ W.) lies in the way, and is very dangerous to fall in with in the night-time, on account of it's lowneſs, and a reef or ledge of rocks which lies off it's S. E. end, it is therefore neceſſary to ſteer ſuch a courſe aswill keep clear of it. The true courſe from Savana la Mar to it appears to be N. 61° W. diſtant about 69 leagues. If the variation of the compaſs at Jamaica be only allowed, which is 6° 30′, the courſe by the compaſs will then be N. 67° 30′ W. or W. N. W. I will venture to affirm, that as many as ſteer ſuch courſe (even allowing three or four miles offing at Savana la Mar to be a ſufficient offing to paſs the Coymanas with) will fall right upon the reef, becauſe the eaſt variation increaſes to the weſtward in thoſe ſeas, as appears by the Tables, as well as that the variation allowed ought to have been at leaſt 7½ degrees; and as a degree in that courſe and diſtance makes a difference in latitude of about 3½ miles,

the courſe ought to have been at leaſt W. N. W. ½W. even to paſs the Coymanas in the day-time; becauſe, in general, there is a leeward current ſetting into the Gulph of Mexico. This current from the north and ſouth ſides of Jamaica meets to the weſtward of Negril Head, ſo that ſhips ſailing to the weſt from the north ſide are drawn ſomething to the ſouth, and ſhips from the ſouth ſide are drawn to the north; but when there is no current, this is not the caſe.

To the eaſtward of the Cape of Good Hope, where the variation is very great, and changes very faſt, the ſame care ought to be taken to allow for it's increaſing and decreaſing. It has often been the caſe, that for want of ſuch allowance the navigator has been led to conceive, that a current has been the cauſe of his error in his reckoning. This led me to inquire into the foundation of an opinion which has been entertained by many navigators, viz. that there is an indraught or current ſerting into St. George's Channel from the ſouth. That there are currents in ſeveral parts of the world is certain, ſuch as the gulph ſtream between the coaſt of Florida and the Bahama Iſlands, which is occaſioned by the combined cauſes of the trade winds, the diurnal motion of the earth, and the influence of the moon, all tending to draw and preſs the waters to the weſtward, which being carried down between the north part of South America and the chain of Weſt India iſlands into the Gulph of Mexico, and there accumulated, until

til it finds vent to the northward round Cape Florida, and ſpreads again into the northern Atlantic Ocean; and even amongſt the Weſt India iſlands there is ſometimes a current ſetting to the eaſtward after ſeveral days of very ſtrong winds, becauſe when the wind ſubſides, the accumulated waters fall back to regain their level. But the ſame reaſons cannot be adduced for a current ſetting into St. George's Channel, the winds being there variable, and the diurnal motion can have no effect in drawing the waters to the eaſtward, but the reverſe. When the wind is very ſtrong from the ſouth, or ſouth-weſt, and a heavy ſea ſetting into St. George's Channel, more water will then be forced in with the flood tide, than will return with the ebb, which will be diſcharged with the ebb to the northward. But when the wind is ſtrong from the north, or north-weſt, it will be the reverſe, a great quantity of water being forced into the Channel from that quarter, and will partly be carried out to the ſouth; ſo that there will be a current from the north, in place of from the ſouth. When the winds are either eaſterly, or weſterly, the flood tides from the north and ſouth meet at the Iſle of Man, and the influx and reflux of the ſouth end of the Channel are equal, as well as of the north end of it. It is therefore impoſſible to conceive that it is the current ſetting into St. George's Channel from the ſouth, that is the cauſe of ſo many ſhips (in coming from the weſtward, and bound up the Engliſh Channel) falling

to the northward of their intended courſe, and being loſt upon the rocks of Scilly. Neither is it to be ſuppoſed that any ſeaman will attempt to make Scilly in the night-time, with his ſhip cloſe hauled with the wind, and a heavy ſea from the ſouthward. We are therefore obliged to look for ſome other cauſe; and if we ſuppoſe that after ſoundings have been ſtruck, or that after the longitude has been run down, ſo that it appears neceſſary to ſteer a courſe for the Channel, ſay from the latitude of 49° 30′, or 49° 45′ N. and longitude of 15°, or 14° W. with a fair wind; if two points be only allowed for the variation, the ſhip will certainly fall upon Scilly, or to the northward of it; becauſe the variation allowed in that part of the ſeas ought to be nearly two points and a half; and I have not a doubt, but that all the misfortunes of this ſort that have happened, and have been imputed to have been occaſioned by the indraught of the current into St. George's Channel, have been for want of a ſufficient allowance for the variation.

It is not to be underſtood that I accuſe navigators in general of neglecting theſe very neceſſary precautions of making proper allowance for the variation, after having inſerted the preceding Tables of obſervations. It is only ſuch as are unqualified to take an azimuth, or have not a dependence upon their own judgments and compaſſes, that after they have taken an azimuth or amplitude, and find that it does not agree with the variation laid

laid down in their books, they then impute the difference to ſome error in their obſervation, or their compaſs, and make uſe of the variation found in their charts, &c. which ought not to be done, becauſe it is the variation of the compaſs that their ſhip is ſteered by, that ought to be accounted for.

From all the accidents which happen on account of the errors in compaſſes, and the inconvenience and time that is neceſſary in taking an azimuth, and the impoſſibility of either taking an azimuth or an amplitude, when an horizon is not to be got, &c. it is clearly evident, that the new tables of the variation of the compaſs, and the new-invented meridional and azimuth compaſs, and the improvements upon compaſſes in general, which are deſcribed in this Treatiſe, are of very great utility and advantage to navigation, particularly the meridional and azimuth compaſs, which coſts very little more than the common azimuth compaſſes at preſent in uſe; as with it a true meridian and the variation can be found every minute that the ſun makes his appearance, at firſt view, and at any time of the day, without any calculation whatever. An azimuth or an amplitude can alſo be taken with it at any time of the day, when the ſun's altitude does not exceed 70°. The amplitudes are taken with it without making any uſe of the horizon. When an horizon is not to be got, the ſun's altitude may be taken by it with tolerable exactneſs; it may be ſaid, with great exactneſs, as an error of two minutes can hardly

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ever happen. As the variation can be taken by it in any creek or corner of a bay, where the land intervenes with the horizon, in the ſpace of 10 or 15 ſeconds, and the elevation of all inacceſſible mountains, &c. it is therefore far ſuperior to any other inſtrument, for ſurveying of coaſts and harbours, &c.

That this inſtrument anſwers for all the purpoſes here ſet forth, appears by the following Reports, which were made in conſequence of orders (for a trial of it) from My Lords Commiſſioners of His Majeſty's Board of Admiralty.

Invincible, Spithead,
March 21, 1794.

" Sir,

" Be pleaſed to acquaint my Lords Commiſſioners of the Admiralty, that, agreeable to their Lordſhips order, in the abſence of the Hon. Capt. Pakenham, I received on board his Majeſty's ſhip Invincible, Mr. Ralph Walker, in order to his making trial of a Meridional Compaſs.

" The Compaſs anſwered in every reſpect, and aſcertains the variation with the greateſt accuracy at any time of the day, as ſet forth by Mr. Walker.

" I have the Admiral's * directions to ſignify his approbation, and to ſay, " he conſiders the Compaſs

* Admiral Macbride.

paſs of ſuch importance, that he has ordered one to be made for his own uſe, under the direction of the inventor."

"I am, &c. &c.

L. W. Halſted."

(A Copy)

Ph. Stephens, Eſq.

OBSERVA-

OBSERVATIONS made on Board His Majesty's Ship GLORY, with Mr. WALKER's New-Invented AZIMUTH COMPASS, compared with the Ship's Azimuth and Binacle Compasses.

Week. Days.	Month. Days.	Time.	Places where.		Observations made.		Variation by		Bearings of the Sun by		Ship's Head, by	
		H.M	Lat.	Long.	Alt. corrected	Delineation.	Ship's Compass.	Walker's Com.	Ship's Compass	Walker's Compass	Azimuth Compass	Binacle Compass
	Mar.											
Friday	7	2 00	50 44	1 6 W		5 03 S.		20 00	S.53½W.	S.52½W.	S.6E ½E.	S.6E.¾E.
Afternoon.		2 35			25 20		20 38	20 45	S.63½W.	S.62½W.	S 6E.¾E.	S. S. E.
		3 00			24 11	5 2 S.	20 19	20 50	S.68½W.	S.67 W.	S.E. ½ E.	S. E.
		3 25						21 00	S.70½W.	S.69 W.	S.49½ E.	S. 57 E.
		3 50						20 30	S.79½W.		S. 51 E.	S. 59 E.
Saturday	8	8 00			11 39	4 43 S.	23 32	24 00	S.49 E.	S. 43½E.	N.10 E.	N. 10 E.
Afternoon		8 10			14 32	4 43 S.	23 23	23 00	S.38¾E.	S. 38 E.	N.17 E.	N. 17 E.
		8 45			18 29	4 42 S.	23 19	23 00	S.32¼E.	S. 34 E.	N.44 E.	N. 4 E.
		9 00			21 6	4 42 S.	22 41	22 00	S.28½E.	S. 31 E.	N.71 E.	N. 68 E.
		10 00						22 30	S.21 E.	S. 23½E.	N.75 E.	N. 71 E.
		10 10			28 53	4 42 S	24 9	24 30	S.11½E.	S. 13½E.	N.29½E.	N.28 E.
Friday A. M.	20	9 20	49 40	5 23W	27 43	0 24 N	28 00	28 00	Compasses agree.		W. ½ N.	W. 6 N.
Afternoon.		3 30		5 28W	25 38	0 29 N	23 00	24 00			S. 6 E.	S. 6 E.

(On

On Friday the 7th.—The azimuth compaſs was placed on the deck where the foremoſt binacle ſtands, and Walker's compaſs four feet before it, on one of the ſmall deal tables. The iron ſtantions, or railing of the hatchway, leading to the wardroom, was diſtant five feet before Walker's compaſs. The difference in the compaſſes was intirely owing to their ſituations, which was clearly proved by frequently exchanging places.

On Saturday the 8th.—Situations of the compaſſes were as above; but perceived that Walker's compaſs was not correctly ballanced, therefore the mean between the two ſides was taken.

Friday the 20th.—Theſe two obſervations could not be aſcertained on the compaſs nearer than a degree, on account of the ſhip's motion.

From the above obſervations it appears, that the variation obſerved at one view by Walker's compaſs, and that obſerved by the ſhip's compaſs, by the bearing and altitudes, were generally very near the ſame. But it is evident, that the variations given by both compaſſes at different times and ſituations, diſagree very much; whether any part of this diſagreement may be owing to the time of the day the variations were taken, I cannot take upon me to determine; but I am pretty well convinced that the quantity and vicinity of iron in moſt ſhips has an effect in attracting the needle; for it is found by experience, that the needle will not always point in the ſame direction when placed in different parts of the ſhip: alſo, it is rarely found

that two ſhips ſteering the ſame courſe by their reſpective compaſſes will go exactly parallel to each other; yet theſe compaſſes, when compared on board the ſame ſhip, will agree exactly.

From theſe circumſtances, I think Walker's compaſs peculiarly advantageous to ſhips, by it's property of readily aſcertaining at one view the variation; and at the ſame time, by comparing with the binacle compaſs, diſcovers what errors it may be liable to.

M. Downie, Maſter.

(A Copy.)

HINTS

HINTS

RESPECTING

SURVEYING OF LANDS.

ALTHOUGH the intention of writing this Treatiſe was only with a view to the improvement in navigation; yet, before I leave the ſubject, I think it is a duty that I owe to my country, but more particularly to Jamaica, and the Weſt-India iſlands, to point out what advantage this improvement in compaſſes may be of, reſpecting the ſurveying of lands, and fixing the boundaries of eſtates and new ſettlements in all our colonies.

Having taken notice that the variation of the compaſs has been continually changing in all parts of the world, and from the obſervations which are inſerted, it appears that that change is from the eaſt, or that all the lines of the different variations recede from the eaſt towards the weſt. It has alſo been ſhewn, that the change of the variation is greateſt in any given ſpace of time in the longitudes neareſt to the lines of no variation; of courſe

the variation which is eaſt, all over the Weſt-India iſlands, that are to the weſt of the line of no variation, (which is laid down in the new Tables of variation) has been decreaſing; and if we are to judge of the future from the paſt, it will ſtill continue to do ſo, until the line of no variation paſs to the weſt of them, and then the variation will be weſt, and increaſe at a conſiderable rate, until it becomes nearly ſtationary, and then decreaſe again with acceleration, until the other line of no variation comes to the ſame places, and then the variation will again be eaſt.

There can be nothing more abſurd than to ſay, that the variation has changed ſo much for every year for ſo many years paſt, at any one place, becauſe near to the lines of no variation this variation increaſes and decreaſes a great deal more in a degree of longitude, than at longitudes which are at equal diſtances from them.

But if it be required to be known at what rate the lines of no variation change their places, we can then anſwer with a comparative degree of certainty. By *Table* V. *page* 22, it appears that in the year 1704, the Atlantic line of no variation was at about the longitude of 19°W. upon the equator, and at this preſent time it is nearly at 49° W. which makes a progreſs to the weſtward of 30° in ninety years, or twenty minutes or miles in one year. If we look into the new Tables of variation, we will there find, that in the latitude of Jamaica, or in 18° N. the line of no variation

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is at about the longitude of 58° W. and if it continues to move at the above rate of a degree in three years, it will be at Jamaica in the year 1854, and after that time the variation will be weſterly. By the ſame rule, the variation for any other place near the equator * may be found for any other year. If it be wanted to be known what the variation will be at Jamaica in the year 1824, at the above rate of allowing 10° for thirty years, the variation that is 10° to the left-hand of the longitude of 78° the longitude of Jamaica, or in the common angle of meeting for the latitude of 18° N. and longitude of 68° W. the variation is 3° 21′ E. for the variation at Jamaica at that time.

Now as all the lines and boundaries of eſtates in the Weſt-India iſlands, and the plats of them returned into the Offices of Record, have been all laid down from the magnetic courſes, without paying any reſpect to the true meridian; it is therefore evident that this change in the variation has been the cauſe of numberleſs law-ſuits, and the ruin of many; and will ſtill continue to be ſo, unleſs the Legiſlature interfere, and put a ſtop to this ridiculous neglect.

This is not a new remark; Doctor Long, a very intelligent and philoſophical writer, in his Hiſtory of Jamaica, has made the following obſervation: "A re-

* I ſay near the equator, becauſe it does not appear that the magnetic poles, with the ends of the lines of no variation, which are in high latitudes, change their places with the ſame uniform regularity that they do there.

"A regular attention to the courſe of this variation is of the utmoſt importance alſo to landed property in this iſland, in regard to the true fixing of boundaries; their uncertainty having been a conſtant ſource of diſpute and litigation, ever ſince the iſland was firſt ſettled. Formerly, ſurveys were merely imaginary, ſo that it is but of late years that our ſurveyors have been conſtrained by mere dint of penal laws, to make actual ſurveys. If we ſuppoſe an actual ſurvey made, and the lines duly marked on earth, or on trees, in order for a patent purſuant to the diagram returned, and that a diſpute concerning the fixings on all ſides ſhould happen five or ſix years afterwards, it is highly probable that, on the faireſt re-ſurvey, a moſt material difference will be found, if the firſt ſurveyor has not allowed for the variation of the needle, but has taken the magnetic meridian for his guide; or if he has made an allowance, but the ſubſequent ſurveyor ſhould not do the like, a conſiderable alteration may be made to the boundary in the courſe of a few years, and the ſite of the plat varied, both with reſpect to it's eaſtern and weſtern lines. The effect has undoubtedly happened in a multitude of examples, ſince few ſurveyors here advert to it, or make any ſpecification of it, either on the original diagram, or on a re-ſurvey.

"This is ſufficient to ſhew what an equivocal uſe we make here of the term *boundary*, which, inſtead of being rendered ſo uncertain by the omiſſion of ſurveyors, the decay or deſtruction of marked trees,

trees, and other cauſes, ought to be perfectly diſtinct and obvious, ſo as to be aſcertained upon the view only.

"It is needleſs to add the many hardſhips which may ſpring from this irregulariry, to the vexation and diſturbance of the poorer ſettlers, who are ill able to conteſt their location with a graſping, litigious, and opulent neighbour.

"For putting a ſtop to ſuch injuſtice, the Legiſlature cannot interpoſe too ſtrictly; and, next to regulating the qualifications, duties, and proceedings of every ſworn ſurveyor belonging to the iſland, it might, perhaps, be attended with very happy effects, if every proprietor of land, or his agent, ſhould be obliged by law to make an annual *perambulation* round his lines, on a certain day to be fixed by the law, in that ſeaſon of the year which has uſually been experienced the drieſt and moſt convenient for the purpoſe, in each reſpective pariſh. By this eaſy method the marks might be conſtantly preſerved or renewed, as they are in England, where this is the cuſtomary practice for aſcertaining the bounds of pariſhes, manors, &c. Re-ſurveys would become unneceſſary, and many expenſive law-ſuits be prevented."*

If we look into the laws of Jamaica, we will there find, that many endeavours of the Legiſlature of that iſland have been exerted to make the boundaries of landed property more permanent and ſecure, and to conſtrain ſurveyors to perform their duty

* Long's Hiſtory of Jamaica, book iii. chap. vii. page 673.

duty faithfully, as will appear by the following extracts.

The firſt is,—An act for regulating ſurveyors.

A.D. 1683. 35 Cha. II. Chap. v. } Be it enacted by the Governor, Council, and Aſſembly, and it is hereby enacted by the authority of the ſame, That no perſon whatſoever ſhall preſume to act or perform the office or employment of a ſurveyor-general within this iſland, before he hath given good and ſufficient ſecurity in the ſum of four thouſand pounds current money of this iſland, for the juſt and faithful performance of his office and truſt, according to the duty of his ſaid office and employment, and that the bonds of ſecurity be carefully kept and recorded in the ſecretary's office; and upon any damages received by any perſon from the ſaid ſurveyor, or any deputed under him, in the negligent or corrupt performance of his or their ſurveys, and due application thereon made to the Governor, the ſaid bond ſhall be put in ſuit, and due recovery thereon made for ſuch damages as they ſhall prove to have received, &c.

The ſecond is,—An act for the further directing and regulating the proceedings of ſurveyors.

A. D. 1683. 35 Cha. II. Chap. vi. } Foraſmuch as it hath been found by experience, that the act intitled, "An act for regulating ſurveyors," hath not ſufficiently provided againſt the ſeveral abuſes, by ſundry evilly diſpoſed ſurveyors, formerly, and now alſo often done and committed, contrary to their duty and truſt

truſt repoſed in them, to the damage of his Majeſty, and alſo of his liege people of this iſland, and which in ſome caſes may tend to the utter ruin of many of his good ſubjects: For prevention whereof, *Be it enacted by the Governor, Council, and Aſſembly, and it is hereby enacted and ordained by the authority of the ſame,* That no ſurveyor whatſoever preſume to deliver any plat, whereby any parcel of land ſhall paſs the broad ſeal of this iſland, before he hath himſelf, in his own perſon, actually ſurveyed and meaſured the ſaid land on every ſide thereof, where it is acceſſible and poſſible to be done; and hath alſo ſeen the lines fairly made, and the corner trees marked with the firſt letters of his name and ſurname, expreſſed in the order; and that the ſaid plat ſhall truly repreſent the reſpective parcels of land, with their true bounds and bearings, and expreſſing the ſort of wood every corner tree is of, with the alphabetical marks aforeſaid; and alſo inſert the ſcale of the ſame, either drawn or expreſſed therein, under the penalty of fifty pounds for every ſuch default.

The third is,—An act for further quieting poſſeſſions, and regulating re-ſurveys.

A. D. 1731. Preamble. 4 Geo. II. Chap. iv. Whereas nothing can tend more to encourage the ſettling of this iſland, than the quieting ſuch perſons who are already ſettled, or ſhall hereafter ſettle in the ſame, in the poſſeſſion of their landed eſtates: And whereas the ſeveral acts hitherto made for that purpoſe have not proved effectual, and many expenſive and vexatious ſuits

at law and equity have been already, and hereafter may be commenced, by reaſon of the uncertainty of the lines and boundaries, &c. &c.

II. And for the better aſcertaining the bounds of all lands which ſhall be hereafter diſputed, and for preventing the evil practices of ſurveyors, whereby ſo many vexatious and expenſive ſuits may be commenced and ſupported, *Be it further enacted by the authority aforeſaid*, That whenever any law-ſuit ſhall hereafter be brought for lands, where the boundaries ſhall be diſputed, the judges before whom the ſame ſhall ariſe, ſhall adjudge the real run and marked lines, which are proved before them to be the real original run and marked lines, or ſuch that have been deemed, reputed, or taken to be the marked lines for the ſpace of ten years laſt paſt, to be the true boundaries of the land in diſpute; or where the real original run lines cannot be proved, that they ſhall adjudge and determine by ſuch lines as ſhall beſt anſwer the courſe and diſtance of the original plat or patent for ſuch lands; provided the ſame be made by a lawful ſurveyor or ſurveyors, duly ſworn to do juſtice in that behalf, and the plat and field-work thereof be annexed, ſigned, and atteſted by the ſaid ſurveyor or ſurveyors; and that the record of ſuch plat, that ſhall hereafter be made in manner aforeſaid, and duly recorded in the Clerk of the Patents' Office, ſhall be binding and concluſive to all parties, and be ſufficient evidence to determine the right of the poſſeſſor

poſſeſſor to all the lands within the lines of the ſaid re-ſurvey plat.

From the preceding extracts it appears, that a reform reſpecting the ſurveying of land, the returning of plats, and regulating and conſtraining ſurveyors to perform their duty with fidelity, was found to be neceſſary at an early period; and the number of laws that have been made from time to time, ſubſequent to the 35 Cha. II. for that purpoſe, all ſhew that there is ſtill ſomething wanting for fixing the boundaries of landed property in the colonies, upon a permanent and ſure footing; and although all the acts of the Aſſembly of Jamaica, reſpecting the above purpoſes, have been made with the beſt intention, yet in reality they are in themſelves, and ought to be intitled, "Acts for the encouragement of litigation, the oppreſſion of the poorer ſettlers, and for the benefit and emolument of ſurveyors, &c." becauſe by them it is enacted, that "where the real original run-lines cannot be proved, they (the judges) ſhall adjudge and determine by ſuch lines as ſhall beſt anſwer the courſe and diſtance of the original plat or patent for ſuch lands, &c. &c."

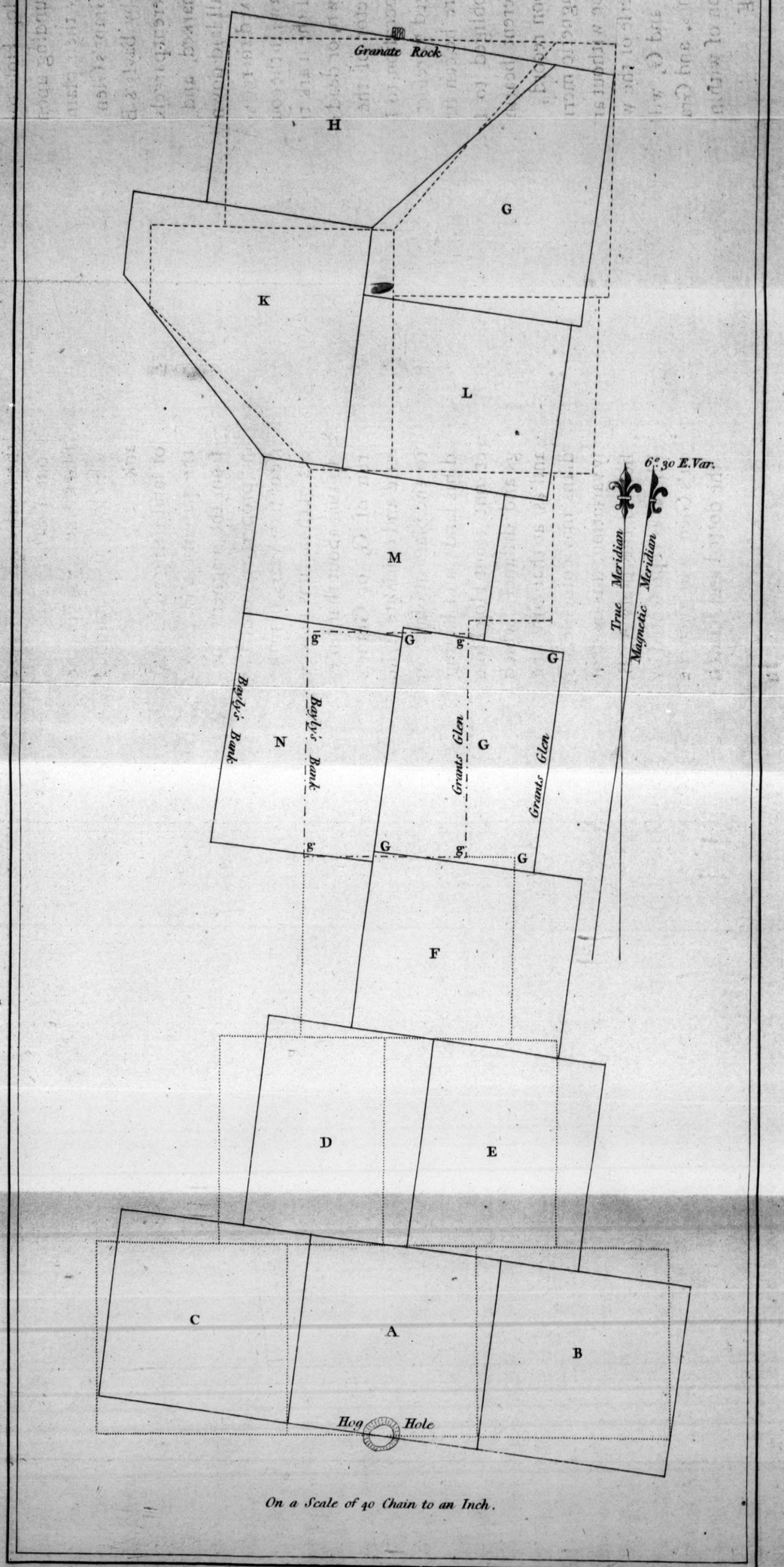
Suppoſe *plate* 7 to repreſent the ſeveral runs of land, viz. H I K L M and N, or Bayly's Bank, all patented in the year 1790, and taking their original calling from Granate Rock to the northward, and butting and bounding upon one another as is repreſented by the plain black lines.

The *plate* alſo repreſents the runs, A, B, C, D, E, F, and G, or Grant's Glen, all patented in the year 1792, and taking their original calling from Hog Hole to the ſouthward, and butting and bounding upon one another, as is repreſented by their plain black lines; except the run G, or Grant's Glen, which is alſo bounded on the weſt by Bayly's Bank.

Theſe different parcels of land being all run out, their lines marked, and the patents and plates (which are all laid down from the magnetic meridian) annexed thereto, and properly recorded as directed by law; in the courſe of ſixty years, or in the year 1854, all the mark trees of theſe runs may be either cut down, or dead; ſo that about that time, if the proprietor of the run of G, or Grant's Glen, have occaſion to ſettle and cultivate it, he will be obliged to reſort to the plats in office on record, before he can find his land; and having done ſo, is obliged to ſet out from Hog Hole with the different bearings and diſtances which are found upon record; and as at that time the true and magnetic meridians may coincide, or the compaſs be without any variation, it is evident that the traverſe of the whole of the plats A, B, C, D, E, F, and G, will be as is repreſented by the dotted lines, and Grant's Glen will then be taken poſſeſſion of within the dotted and ſcratch lines g, g, g, g.

In

PLATE VII.



On a Scale of 40 Chain to an Inch.

London. Printed for and Published by Ralph Walker, of Jamaica, as the Act directs 4th Sept.r 1794.

Jn.o Lodge sculp.

In the year 1860, the proprietor of the run of land N, or Bayly's Bank, may alſo have occaſion to cultivate it, and for the above reaſons obliged to traverſe from Granate Rock to the northward, which traverſes are repreſented by the ſcratched lines, and the run of Bayly's Bank will be found to intirely cover the run of Grant's Glen, as is deſcribed by the ſcratch and dotted lines g, g, g, g.

It is not to be ſuppoſed that the proprietor of Bayly's Bank, or that any man will tamely give up his property; and yet the lands in diſpute are in the legal poſſeſſion of the proprietor of Grant's Glen,—I ſay, *legal* poſſeſſion, becauſe it is enacted that "where the real original run-lines cannot be proved, they (the judges) ſhall adjudge and determine by ſuch lines as ſhall beſt anſwer the courſe and diſtance of the original plat or patent for ſuch lands, provided the ſame be made by a lawful ſurveyor or ſurveyors, duly ſworn to do juſtice in that behalf; and the plat and field-work thereof be annexed, ſigned, and atteſted by the ſaid ſurveyor or ſurveyors, and that the record of ſuch plat, that ſhall hereafter be made in manner aforeſaid, and duly recorded in the Clerk of the Patents' Office, ſhall be binding and concluſive to all parties, and be ſufficient evidence to determine the right of the poſſeſſor to all the lands within the lines of the ſaid re-ſurvey plat."

By the ſame laws, the proprietor of Bayly's Bank is alſo legally intitled to the lands, becauſe

it

it exactly correſponds with the bearings and diſtances of his original patent and plat thereunto annexed, his patent being alſo prior to the patent of the run of Grant's Glen, and the proprietor of Grant's Glen being in poſſeſſion only ſix years, does not do away the right of the proprietor of Bayly's Bank.

If the proprietors of theſe runs of lands ſhould both happen to be rich, and have the ſame diſpoſition and itch for litigation, that ſome people have at preſent, theſe runs of lands would produce a very fine and plentiful harveſt for a whole generation of ſurveyors and lawyers. But which of the proprietors ought to have the land, we will leave for the determination of the judges. One thing is certain, that they cannot return to their original runs, becauſe all the lands around them are ſuppoſed to have been patented about the year 1850, and occupied from that time, which will eſtabliſh a good and ſufficient right to the poſſeſſors of them.

From what has been ſaid, it is clear that the preſent laws now in force in our colonies are very defective, and leave a very wide opening for litigation, and the oppreſſion of the poor, by their ill-diſpoſed and rich neighbours.

It ought therefore to be enacted, that in future all patents, plats, ſurveys, and re-ſurveys, which ſhall be done and executed, ſhall ſpecify the true courſe, and be laid down from the true meridian,

accounting

accounting for the variation of the compaſs, whatever it may be at any place and time. Suppoſe the variation of the needle of the compaſs be found to be 6° E. at any one place, it ought to be allowed for upon each courſe; that is to ſay, if a courſe be N. 6° W. by the compaſs, it ought to be ſet down N. If a courſe be N. 25° E. by the compaſs, it ought to be ſet down N. 31° E. If a courſe ſhall be S. 10° E. it ought to be ſet down S. 4° E. and ſo on of every other courſe, by the compaſs, always allowing for the variation: ſo that in any future period, whatever the variation of the needle of the compaſs may be changed to, reference being always had to the true meridian, the patents and plats on record in office, with their courſes, &c. will always be found to agree with the lines upon earth, which is not the caſe at preſent, the courſes being all laid down from the magnetic meridian, which is always changing.

It ought alſo to be made a law, that the proprietors of all lands in our colonies, whether under cultivation or otherwiſe, ſhall be obliged to have the true courſes of the lines of every run or parcel of land that they are poſſeſſed of, aſcertained and put upon record upon the margin of their original patents and plats in the Clerk of the Patents' Office.

If the true meridian be taken at ſome particular corner of a run of land, it will ſhew the true courſes of two of the lines, and all the other lines

that

that ſurround the run will differ the ſame from their true courſes, and will alſo ſhew the quantity of the variation of the needle of the compaſs at the time the lines were run.

Suppoſe a ſquare run of land, the lines of which are deſcribed by the patent and plat on record in office, to be north and ſouth, and eaſt and weſt; if a true meridian be found at any one corner of it, and the north and ſouth line be found to differ 7° N. E. and S. W. it is evident that all the other lines differ as much from their true courſes.

It is a fact, that the lines of all lands which have been patented in the iſland of Jamaica, and run and marked before the year 1750, all differ 7° (and upwards, in proportion to the length of time they have been run, before the year 1750,) from their true courſes.

It may be objected, that it is unneceſſary to eſtabliſh the true courſes of the lines of old runs of land, becauſe they are in general all open and well known upon earth. But it is well known to every one that is acquainted with the iſlands in the Weſt Indies, particularly Jamaica, that the back parts and out-ſkirts of the ſettlements are in general allotted for proviſion grounds; and the negroes ſeldom continue to plant long upon one ſpot, but move from place to place for the benefit of new ſoil, and the grounds that they leave grow up into ruinate, as it is commonly called, or again into woodland, the marked trees being either

either cut down or burnt by the fires in clearing theſe grounds; ſo that the lines are very often not to be found, and recourſe muſt be had to the courſes of the patent and plat upon record in the office; but as the variation may have, or may be changed ſince the time that the lines were run, and if the adjoining run takes it's calling from a different quarter from the other, ſuch as the one from Granate Rock, and the other from Hog Hole, each of theſe runs will apparently treſpaſs upon the other, and a law-ſuit may be the conſequence. If one of the parties be rich, and the other poor, the poor man muſt ſubmit to give up his property, although his houſe and the moſt valuable part of his property may be upon the very ſpot in diſpute, becauſe he is unable to bear the expence * of defending or recovering it.

It

* The expence of recovering or defending the ſmalleſt quantity of land in Jamaica, does not coſt leſs than five or ſix hundred pounds, and ſometimes as many thouſands. That the ſmall ſettlers may not be ſubject to ſuch oppreſſion, it ought to be made a law, that all diſputes which may ariſe concerning the fixing of lines and boundaries of properties (in Jamaica, or any of our colonies) ſhall be decided by arbitration, with leave of appeal. The arbitrators ought to be qualified to examine all ſuch evidence upon oath, as ſhall be brought before them. That the clerk of the peace for the pariſh where the property in diſpute lies, ſhall be obliged to attend the arbitrators, and take down the evidence, with their determination, with every other matter relative thereto; and tranſmit the whole of the proceedings to the clerk of the

It may at firſt be ſuppoſed, that the obtaining the true courſes of the lines of the different properties would be attended with a heavy expence; but that by no means can be the caſe, becauſe with the meridional compaſs which I have conſtructed the true meridian can be aſcertained upon any line or corner of a run of land in the ſpace of one minute, if the ſun is to be ſeen; and having got the true courſe of one or two of the lines, whatever the courſe ſpecified in the patent and plat in office differs from the true courſe found, ought to be allowed to all the other lines of the run, and the true courſes of the whole of the lines recorded upon the margin of the original patent in the Clerk of the Patents' Office.

the court's office, to be put upon record, and ſuch record ſhall be a bar againſt the parties, their heirs, &c. If any one of the parties diſſent from the award of the arbitrators, he ſhall ſignify the ſame to the clerk of the peace at the time that the award is made known to him, and be obliged to bring his action the enſuing grand court after ſuch determination, but ſhall not be permitted to produce any other evidence but ſuch as he produced to the arbitrators. The good effects of ſuch a regulation are obvious; as every encouragement and protection ought to be given to ſmall ſettlers, they being conſtant reſidenters upon their properties, and conſequently the preſervers of internal tranquillity, and defenders of their country.

FINIS.

DIRECTIONS *to the* BINDER *for placing the* COPPER-PLATES.

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